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Group Evaluation System Measuring Self-Reported Cooperative Extension Nutrition Education Program Impact in Adult Limited Resource Audiences With Diverse Literacy Skills.

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GROUP EVALUATION SYSTEM MEASURING SELF-REPORTED COOPERATIVE EXTENSION NUTRITION EDUCATION PROGRAM IMPACT IN ADULT LIMITED RESOURCE AUDIENCES WITH DIVERSE LITERACY SKILLS

A Dissertation

Submitted to the Graduate Faculty of the
Louisiana State University and
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in

The School of Human Resource Education and Workforce Development

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DEDICATION

This work is dedicated to my father and mother, Russell and Josephine Guarino, devoted parents, for their clear vision during my many pursuits of excellence. Grace led the way. It is also dedicated to my lifelong friend and colleague, Dr. Renée Marie Simar, whose perseverance opened doors that led to graceland where Dr. Jon Robertson provided harmony for two more times and beyond. In every recipe, health.

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LIST OF ABBREVIATIONS

ABE =	Adult Basic Education
AMA =	American Medical Association
BMI =	Body Mass Index
CDC =	Center for Disease Control
CES =	Cooperative Extension Service
CSREES =	Cooperative State Research, Education and Extension Service
DSS =	Department of Social Services
EBT =	Electronic Benefit Transfer
EFNEP =	Expended Food and Nutrition Education Program
ERIB III =	Eating Right is Basic Curriculum (3rd Edition)
ESL =	English as a Second Language
FCS =	Family and Consumer Sciences
FG =	Focus Group
FITAP =	Family Independence Temporary Assistance Program
FSNEP =	Food Stamp Nutrition Education Program
FSP =	Food Stamp Program
FNP =	Family Nutrition Program
FNS =	Food and Nutrition Services
FRAC =	Food Research and Action Center
GED =	Graduate Equivalence Diploma
GES =	Group Evaluation System
GPRA =	Government Performance and Results Act
IQ =	Intelligence Quotient

JCAHO =	Joint Commission on the Accreditation of Healthcare Organizations
LSU =	Louisiana State University
LSUAC =	Louisiana State University Agricultural Center
NAEP =	National Assessment of Educational Progress
NALS =	National Adult Literacy Survey
NWGLH =	National Work Group on Literacy and Health
OFS =	Office of Family Support
PARS =	Program Assessment Reporting System
REALM =	Rapid Estimate of Adult Literacy in Medicine
SNE =	Society for Nutrition Education
SSI =	Supplemental Security Income
SU =	Southern University
TANF =	Temporary Assistance to Needy Families
TOFHLA =	Test of Functional Health Literacy in Adults
UMES =	University of Michigan Extension Service
USDA =	United States Department of Agriculture
US DHHS =	United States Department of Health and Human Services
USP =	United States Pharmacopeia
WIC =	Women, Infants, and Children
WRAT =	Wide Range Achievement Test

GLOSSARY

The following terms are operationally defined for the development of the Group Evaluation System (GES):

Adult limited resource audience - Individuals assumed to be a minimum of 16 years of age, no longer enrolled in formal education grades K-12 who are Food Stamp Program (FSP) participants or any indigent individual that might be eligible for benefits, but is not a participant

Andragogy - Teaching adults

Exit survey- End-of meeting questionnaire

Family and Consumer Sciences Adult Extension Agent - Land grant university professional field faculty with background in Home Economics, or a similarly related field located in a parish and serving local residents

Food Stamp Program - Food assistance program promoting the general welfare, and safeguarding the health and well-being of the nation's population by raising levels of nutrition among low-income households

Functional literacy - The ability to perform basic reading and numeracy tasks necessary for routine life challenges, such as the ability to read at or above a fifth grade level

Impact - Societal outcome of intervention or program

Impact evaluation - The extent a program or an intervention contributes to accomplishing its stated goals; describes the specific effects of program activities on a target population

Indicators - Specific elements indicating whether or not outcomes are achieved

Literacy - Ability to read and write, and to speak English, as well as compute and solve problems at those levels of ability necessary to function in society and to achieve personal goals

Nutrition education - Any set of learning experiences designed to facilitate the voluntary adoption of eating and other nutrition-related behaviors conducive to health and well-being

Nutrition promotion - the translation of science-based dietary guidance into consumer-oriented messages that facilitate appropriate eating behaviors

Outcome - Change in behavior, habits or conditions, indicating progress toward achieving the goals of a program or intervention strategy

Parish - Term used in Louisiana to identify the 64 civil geographic divisions, synonymous with "county"

Pictograph – A simple line drawing or picture that represents an idea

Poverty- Lack of money or material possessions covering a range of economic and social characteristics

Process evaluation - Ongoing monitoring of program allowing for timely refinements that promote program success; measures intermediate outcomes; allows for mid-course adjustments to improve the program

Program impact - Social benefits or effects resulting from programmatic effort

Self-selected- individual determines option or choice

Semi-functional reader - A reader who lacks the basic skills necessary to read at a level capable of performing tasks required in daily life; one who is unable to read either a newspaper or directions on a box of cake mix functionally illiterate

U. S. Department of Agriculture Food Stamp Nutrition Education -State Grants that address nutrition education needs of actual and potential food stamp families, having the goal of improved health and well-being in these families

USDA Cooperative Extension Service (CES) - University-based statewide educators who target delivery of research-based information to specific audiences, using effective, low-cost methods affecting families, community, and agriculture

ABSTRACT

A Group Evaluation System was developed to evaluate the effectiveness of the Louisiana State University Agricultural Center Family Nutrition Program for use with adult limited resource audiences with diverse literacy skills. Using existing nutrition education resources, an exit survey instrument was developed and tested for validity and reliability. The group administered test format incorporated food associated graphic illustrations and response symbols with written questions read by the instructor. An instrument mock-up was reviewed by an expert panel and two intended-audience focus groups, one with functional reading skills and one without.

During data collection, a pretest was conducted with a convenience sample of 96 adult limited-resource individuals with diverse literacy skills. Participants received a lesson on food safety and responded to the group-administered evaluation. The test was followed by a personal interview verifying the structured survey. Descriptive statistics and frequency measures were calculated on quantitative data. The expert panel rated the content validity of the instrument. There was a mean validity score of 4.25 on a scale with 1 (poor) to 5 (excellent). Qualitative data were analyzed by sorting transcript material into themes. Common suggestions were: use more white space, simplify illustrations, and use common words. Response agreement between the group-administered instruments and personal interviews was 87.22%, while aggregating positive responses increased agreement between tests to 97.28%. Resulting implications are that the associated pictorials and response symbols with orally presented text provided a measurable degree of validity and reliability for group-administered evaluations for limited-resources adult audiences with diverse literacy skills.

INTRODUCTION

Overview

Foodborne illness is a substantial problem in the United States and accounts for 76 million illnesses and 325,000 hospitalizations each year (Mead *et al.*, 1999). Further, it is estimated that 5,000 deaths occur annually from foodborne illness and other diseases. Consumers frequently fail to properly refrigerate perishable food or wash cutting boards and utensils with soap and water after contact with raw meat and poultry. Other risk factors contributing to foodborne illness are unsafe holding temperatures of foods and poor personal hygiene of persons handling the food (Collins, 1997). These practices translate into increased morbidity, mortality, and economic costs resulting from foodborne illness and other diseases. An estimated $6.9 billion per year is the cost of human illness from five foodborne pathogens (Economic Research Service, 2000). Either directly or indirectly, quality of life and productivity are negatively affected by foodborne illness and other diseases related to unsafe food practices.

Fortunately, effective nutrition education intervention promotes greater awareness of the health risks of inappropriate food handling and reduces the incidence of related illness (Economic Research Service, 2001b; Nies & Van Laanen, 1995). For example, studies indicate that Americans are cooking their hamburgers more thoroughly partly due to increased food safety public education efforts (Economic Research Service, 2001a). This simple single consumer behavior alone may save approximately $7.4 million annually from lower medical costs and lost productivity due to Escherichia coli O157:H7.

Community nutrition education programs on food safety are provided by the United States Cooperative Extension Service (CES) operating under state chartered Land Grant Universities. Partially funded by the United States Department of Agriculture (USDA) CES provides science based nutrition education programs to communities as part of its public health mission (Seevers, Graham, Gamon, & Conklin, 1997).

Educating consumers requires an understanding of their learning needs and limitations (Merriam & Cunningham, 1989). A lack of literacy skills is recognized by adult educators as a significant limitation to education. Research confirms some individuals who are most in need of health information, *i.e.*, the poor, may have access barriers to health information, partially due to a lack of literacy skills (American Medical Association Council on Scientific Affairs, 1998; Baker, Parker, Williams, Clark, & Nurss, 1997; Davis *et al.*, 1991; Gazmararian *et al.*, 1999; Lee, 1999).

A correlation has been established between poverty and literacy skills (Kirsch, Jungeblut, Jenkins, & Kolsted, 1993). A national profile of literacy revealed that of those adults functioning at the lowest reading level, 43% lived in poverty (National Institute for Literacy, 1998). A significant population in the United States struggles with poverty (U.S. Bureau of the Census, 2000). Among the states, Louisiana has a disproportionate number of low-income households. As recently as 1997, about 20% of Louisiana residents lived below the poverty level, and in 1998, Louisiana ranked second in the United States for persons living in poverty (U.S. Bureau of the Census, 1998).

In Louisiana, Louisiana State University (LSU) and Southern University (SU) are both Land Grant Institutions providing community outreach services for university

based agricultural and family science research (Seevers *et al.*, 1997). Extension education specialists present scientific information to a broad audience with varying economic, social, and educational characteristics. Programs target at-risk individuals and families with practical and useful information to improve the health and wellbeing of the citizens of Louisiana.

In 1999, the Louisiana State University Agricultural Center (LSUAC) Division of Family and Consumer Sciences (FCS) developed a "Nutrition Focus Area Evaluation System" containing five program objectives. Among those objectives was one addressing the reduction of foodborne diseases through nutrition education. Nutrition education intervention strategies target groups at risk, *i.e.*, limited resource audiences. The FCS nutrition evaluation plan detailed an evaluation procedure to collect data and establish a protocol to measure program impacts (Louisiana State University Agricultural Center Cooperative Extension Service, 1999a). This FCS evaluation protocol employs a written, text based, exit survey model.

Statement of Problem

The LSUAC Personnel, Organization, and Development department identified a need for a group evaluation tool for use with adult limited resource audiences with semi-functional reading skills (Robert Richard, personal communication, March, 1998). A written survey or questionnaire is a common evaluation tool which is widely used by LSUAC CES nutrition education programs to measure program impact (LSUAC CES, 1999a). A text based survey instrument is an economical and practical approach to impact measurement for literate audiences. A written language instrument has more limitations when working with adult semi-functional reading populations (Gaston &

Daniels, 1988; National Institutes of Health and National Cancer Institute, 1989). An additional limitation when working with this audience is the observed tendency of some adult semi-readers to conceal or cloak their low reading competency level (Davis, Michielutte, Askov, Williams, & Weiss, 1998; Fisher, 1999; Gaston & Daniels, 1988).

While there is a widespread recognition of the need for specialized presentations for the nutrition education of groups who lack literacy skills, there are few generally accepted and cost efficient specialized methodologies available to measure the effectiveness of the instructional methods employed. For audiences with semi-functional reading skills, measuring program effectiveness entails the application of communication techniques beyond the written word to compare measured learning criteria with the stated lesson objectives (Merriam & Cunningham, 1989).

Other forms of communication are frequently applied to facilitate the transmission of information (Merriam & Cunningham, 1989). Multi-dimensional teaching strategies bundle more than one element into an overall presentation and any methodology designed to measure the effectiveness of these strategies should be sensitive to the inherent reading limitations of the target audience. An ideal test methodology should be able to elicit a meaningful response from a diverse population including adult semi-functional readers while maintaining the integrity of the test methodologies employed.

Purpose and Objectives

The purpose of this study is to develop, test, and validate an LSUAC Group Evaluation System (GES) measuring self-reported CES nutrition education program impact in adult limited resource audiences with diverse literacy skills. Extension

educators require a consumer oriented GES that efficiently and conveniently gathers useful data on the impact of nutrition education from adult limited resource audiences of diverse literacy skills. Ideally, the model would generate data necessary for federal performance based funding and provide a flexible evaluation design for use in multiple content areas.

To meet these evaluation criteria, a review of the literature was conducted to identify effective nutrition education program measurement tools that were compatible with the nutrition education evaluation strategies of the LSUAC. Failing to identify a usable model, a compatible model would be adapted for the LSUAC system. If no acceptable model was found or adapted, then an original measurement model would be developed for the LSUAC system.

The development of the GES was based upon two models found in the literature. The combined instruments yielded a system capable of measuring the effectiveness of nutrition education programs using group administered questionnaires on audiences which may include adult semi-functional readers. The GES model may be easily adapted to other educational objectives and future users can use this methodology to apply to their particular setting. To guide the focus of this study one hypothesis and five supporting objectives were identified.

Hypothesis: A group evaluation system (GES) will provide valid and reliable measures of nutrition education program impact in adult limited resource audiences with diverse literacy skills.

Objective 1. To develop an instrument for evaluating the effectiveness of a Cooperative Extension nutrition education instructional program that can be

used accurately with adult limited resource program participants with diverse literacy skills.

Objective 2. To establish the content validity of the instructional program evaluation instrument for use with adult participants who were semi-functional readers.

Objective 3. To establish the content validity of the instructional program evaluation instrument for use with adult participants who were functional readers.

Objective 4. To estimate the reliability of the instructional program evaluation instrument by determining the level of agreement between the responses from the group administered format and the personal interview.

Objective 5. To achieve a 70% agreement between the group administered format and the interview or, failing to achieve this threshold agreement initially, to identify and implement revisions to the instrument to improve the estimated reliability.

Significance of the Study

If the objectives of this study are achieved, the GES could have the potential 1) to influence program evaluation, 2) to improve community nutrition education, 3) to increase the ability to communicate with hard-to-reach audiences, 4) to promote cognition and learning for special needs learners, and 5) to provide positive influences on public health.

Program Evaluation

An Efficient Format

The GES may be more efficient and therefore less labor and time intensive when compared to traditional semi-functional reader evaluation methods like focus group discussions and individual interviews (AMC Cancer Research Center and Centers for

Disease Control and Prevention, 1994; Macario, Emmons, Sorensen, Hunt, & Rudd, 1998). The advantage of having a group structured format that improves communication with semi-functional readers is that it reduces the time and personnel needed to administer the program evaluation. The implementation of this tool would provide Louisiana's limited resource population with a documented voice in the evaluation of nutrition education program impact as reported to funding sources. The GES may also serve as a practical tool for parish FCS agents to analyze and report on the effectiveness of local programs.

Useful Evaluation Model

The GES model contains the potential for flexibility through minor content adjustments. For instance, nutrition educators in hospitals and clinics could easily modify the GES content to meet their respective program requirements. The GES model may also prove useful to educators in their evaluation of participants who, historically, are reluctant to be identified as semi-functional readers (Mayeaux *et al.*, 1996).

Community Nutrition Education

Program Improvement

The GES may strengthen self-reported measurement of nutrition education program impact thereby improving planning, implementation, and evaluation of publicly funded nutrition education programs. Since the GES was designed for adult limited resource audiences with diverse literacy skills, widespread use of this model by educators could increase awareness of the special needs of adult learners with semi-functional reading skills. As a consequence of a more inclusive data collection method,

Extension engagement with this segment of the population would be improved by increased measurable instruction to adult semi-functional readers.

Hard-to-Reach Audiences

Data collected by the GES from special needs groups would be available to guide the outreach efforts of CES by encouraging an expanded effort to educate semi-functional reading groups found in prisons or Adult Basic Education (ABE) classes. An anticipated ancillary benefit of this study is that participants may promote the "user friendliness" of the GES design to friends and family within their sphere of influence thereby encouraging other semi-functional readers to attend future programs. Semi-literate audiences may provide insight into adult learning for special needs populations.

Cognition and Learning

Pictorials have historically been used for communication across multi-lingual barriers. Graphic illustrations incorporated into evaluation measurements may more readily convey the necessary data (Michielutte, Bahnson, Dignan, & Schroeder, 1992). Research indicates pictographs can serve as cues to help low literacy persons remember health information presented orally (Houts *et al.*, 1998). The GES model may facilitate communication, comprehension, and retention of lesson and content using graphic illustrations.

Special Needs Learners

Adult limited resource individuals with semi-functional reading skills are often sensitive to being identified as "illiterate." Traditionally, the stigma of being "illiterate" is associated with low self-esteem and poor self-image (Baker *et al.*, 1996; Davis, Williams, Branch, & Green, 2000; Parikh, Parker, Nurss, Baker, & Williams, 1996).

Since the GES is particularly sensitive to the learning needs of participants, the value they experience when their opinions are recognized should work to provide these individuals a greater sense of belonging and encouragement. In terms of psychological value, this user friendly formula, in addition to providing data for measurement, may offer encouragement to adult semi-functional readers to acquire additional communication skills (C. C. Doak, Doak, & Root, 1996).

As an added advantage, heightened attention to adult semi-functional reader audiences in other program areas may be encouraged through the administration of the GES. Following exposure to the GES, CES collaborating agencies, such as the Council on Aging and Headstart, may be prompted to more intensively address the special learning needs of semi-functional reading adults. As an enriched evaluation experience, the GES model may be readily adapted by other educators thus providing more opportunity for these agencies to promote better communications with this audience.

Public Health

Hard-to-reach adult semi-functional reading audiences may be provided with greater access to nutrition education programming and evaluation, possibly resulting in improved individual and family health and well being. For instance, access to food and nutrition information about food safety may prove invaluable, given the human and financial costs associated with preventable diet and food related diseases. Through enhanced community outreach efforts, both the health and the quality of life for adult limited resource populations can be improved through more effective nutrition education thus potentially reducing related health costs for individuals, families, and

society as a whole (Food Nutrition and Consumer Services, 1995; Frazao, 1995; Marwick, 1997).

Limitations and Assumptions

1. This study did not address adult literacy questions. The focus of the study centered entirely on improved program evaluation.
2. This study was limited by the ability of the FCS and collaborating agency staff to judge the literacy skills of participants; some semi-literate adults "cloak" or hide their reading abilities from others.
3. The study design was limited to Extension nutrition education of adult limited resource audiences, excluding children and adolescents enrolled in formal education grades K-12.
4. While it was intended that the majority of study subjects have English as their native language, no effort was made to identify or exclude individuals having English as a second language.
5. The GES employed a single Extension nutrition education food safety lesson for presentation to participants for assessment of the validity and reliability of the self-reported program. The scope of this investigation was not intended to test the Extension nutrition education curricula.
6. Following an oral reading of the consent form subjects acknowledged their participation by signing the form. This knowledge may have influenced the research setting and thereby influenced the outcomes.
7. The same nutrition educator conducted the GES model field test and the study phase of the investigation minimizing the potential for administration errors.

8. The original LSUAC FCS evaluation statements used in the GES model had multi-stem components, known to be cumbersome and less clear than single stem items. Original statements remained unchanged for this study and the potential to cause confusion with respondents was accepted for reasons of FCS system compatibility.

REVIEW OF LITERATURE

Nutrition Education: Reducing Foodborne Illness

One of the major nutrition and food-related concerns of the United States Department of Agriculture (USDA) is food safety and the prevention of foodborne illnesses and other diseases (Centers for Disease Control and Prevention, 2000; Economic Research Service, 2000, 2001a, 2001b; U.S. Department of Health and Human Services [US DHHS], 2000a, 2000b). In 1997 federal agencies addressed the issue of food safety with "From Farm to Table: A National Food Safety Initiative" and provided $43.2 million to fund a nationwide early warning system, to increase inspections, and to expand food safety research, training, and education (Food and Drug Administration, 1997). This initiative intensified food safety education efforts to the public for potentially improve public health and food handling practices. Six agencies in the federal government have primary responsibility for food safety (Food and Drug Administration, 1997). Cooperative Extension Service (CES) is one of the USDA's agencies charged with this mission. Among the goals and objectives of this initiative is to further food safety education to promote understanding and practicing proper food safety techniques. Research is necessary to develop appropriate tailored messages that address the risks relevant to each audience. A call for innovative outreach methods is recommended by this initiative.

Studies show that more than 50% of the public eats raw or undercooked eggs, 23% eats undercooked hamburger, 17% eats raw clams and oysters, and 26% do not wash cutting boards after using them for raw meat or poultry (Food and Drug Administration, 1997). Four bacterial and viral food-related diseases targeted in the

United States are Listeria monocytogenes, Campylobacter jejuni, Clostridium perfringes, and Escherichia coli 0157:H7. Microorganisms that cause foodborne illness continuously adapt, making it hard to reduce or eliminate them (U.S. DHHS, 2000a). The Healthy People 2010 initiative is a Federal public health strategy which targets members of certain populations having high risk for foodborne illness and related diseases (U.S. DHHS, 2000b). The very young, the elderly, and immunocompromised persons are at greater risk for serious foodborne illnesses. They are vulnerable to smaller doses of organisms and are more likely to die of foodborne disease. The Healthy People 2010 initiative has an objective which targets members of certain populations having high risk for foodborne illness and related diseases (U.S. DHHS, 2000b). The very young, the elderly, and immunocompromised persons are at particular risk for serious foodborne illnesses because they are more vulnerable to smaller doses of organisms and have higher mortality from foodborne disease.

Through intensive public health efforts, food safety objectives established for the Healthy People 2000 initiative have made remarkable progress (Food and Drug Administration, Food Safety and Inspection Service, and Centers for Disease Control and Prevention, 1999). The incidence of campylobacteriosis, listeriosis, and infections caused by Salmonella enteritidis and Escherichia coli O157:H7 has decreased. The 1998 FoodNet Surveillance Results reported the rate of salmonellosis declined 14% between 1996 and 1998. A recent Food Safety Survey tracking the progress of the these food safety initiatives found people who wash their cutting boards with soap after contact with raw meat and poultry increased from 66% in 1988 to 71% in 1998. Efforts to reduce foodborne illness though targeted consumer messages provided a positive

behavior change on this selected food-handling indicator. Community nutrition education targeting at-risk groups are effective methods to reduce food-related illness (Watkins, 1998).

Adult Limited Resource Audiences

A large number of individuals and families in the United States struggle with poverty. Typical limited resource adults might possess several of the following characteristics: over 65 years of age, single women with children, low income and education level, and/or an ethnic minority. Based on a 1998 Census Bureau survey, the USDA estimated that over 10 % of all households in the United States are food insecure, meaning they did not have enough food to meet their basic needs (Food Research and Action Center [FRAC], 2000b).

In 1997, about 20% of all Louisiana families faced daily nutrition and food security issues (U.S. Bureau of the Census, 1998). Louisiana ranked second in 1998 in the United States with persons living in poverty. This situation poses a greater risk for children and the elderly. In the United States, Louisiana had the fourth highest percentage (19%) of elderly who lived in poverty (Council for a Better Louisiana Futures Institute, 1999).

Poverty statistics from the 1990 census identified the poorest in the state as generally being black and/or female. In 1998, 73% of Louisiana Food Stamp participants were non-white (Louisiana Department of Social Services [DSS] Office of Family Support [OFS], 2000a). This group is targeted by Louisiana State University Agricultural Center (LSUAC) CES for food and nutrition education. Louisiana's limited resource population repeatedly displays evidence of increased risk of illness,

single mother households, poor education, exposure to violence, and a lack of home ownership (Council for a Better Louisiana Futures Institute, 1999).

An important public health care challenge facing Louisiana is a high incidence of diet and food-related diseases in low income populations. Nutrition education initiatives are a critical feature of overcoming to the challenges faced by public health care in Louisiana. Suitable program evaluation strategies are an essential component of program accountability and improvement.

Federal Nutrition Assistance Programs: A Response to Poverty

In the United States, a broad based national effort exists to relieve poverty and hunger through food assistance programs which targets the nutrition status of low income individuals and households. There are at least five major Food and Nutrition Service (FNS) Nutrition Assistance Programs: Food Stamp Program (FSP), Food Distribution, WIC, Team Nutrition, and Child Nutrition (Food and Nutrition Service [FNS], 2000). The Food Stamp Program is the first line of defense against hunger, enabling limited resource families to buy nutritious food with Electronic Benefits Transfer (EBT) cards (FNS, 2000).

The Louisiana FSP is funded by the USDA and managed by the Louisiana Department of Social Services (DSS), OFS, which provides food assistance to needy families. The total food stamp benefit to Louisiana for the State Fiscal Year 1997-1998 was $467,237,952. Louisiana ranked 10th in the United States for food stamp benefits issued, with one of every nine Louisiana residents receiving benefits (Louisiana DSS, OFS, 2000a). State eligibility requirements for FSP participation vary as each state uses poverty guidelines to establish FSP benefit eligibility. Households unable to meet basic

needs are identified with a "poverty line" (FRAC, 2000b). Generally, households, which have gross incomes below 130% of the poverty line, are eligible for food stamps. In 2000, the poverty line for a family of four was $17,050 (U.S. DHHS, 2000c). With welfare reform measures, the number of food stamp households in Louisiana decreased by 23% between 1989 to 1999 (Louisiana DSS OFS, 2000a).

The Food Stamp Act of 1977 promotes general welfare and safeguards the health and well being of the nation's population by raising levels of nutrition among low income households. FSP regulations allowed state agencies the option of developing nutrition education plans under federal guidelines to promote nutrition education (US Department of Agriculture Program Accountability Division, 1999). According to USDA, increasing public knowledge of desired health and nutrition behaviors are the objectives of this initiative (USDA, 1995).

Louisiana participates in the Food Stamp Nutrition Education Program. Two state agencies, one located at Louisiana State University (LSU) and the other at Southern University (SU), provide services coordinated by the Louisiana DSS. For Federal Fiscal Year 2000, the Louisiana FSP matched $821,985 in combined funds for Louisiana State University and Southern University's CES Nutrition Education Programs (Louisiana DSS OFS, 2000a). LSUAC and SU Extension Services work in tandem to provide nutrition and heath related messages for the citizens of Louisiana.

The LSUAC Family and Consumer Sciences (FCS) nutrition education is designed to meet program objectives by going to locations with which clientele are already familiar. The Family Nutrition Program (FNP) program avoids many of the access barriers often faced by those trying to reach an under-served clientele. Monthly

limited resource audience nutrition education sessions are presented at health units, Head Start centers, day care centers, housing projects, schools, libraries, churches, and other community locations. Exhibits advertising these services are displayed at health fairs, shopping malls, grocery stores, and similar sites.

Semi-Functional Literacy

Definitions of Literacy

During the 1800s, literate was a label given to an individual who could write his/her own name (Cook, 1977). In 1977, Cook cited the U.S. Army's definition of literacy in terms of having about fifth grade level reading skills. Today the word "illiterate" carries pejorative connotations and is being used less frequently (Freimuth & Mettger, 1990). Pejoratives are being replaced by grade level literacy standard (C. C. Doak *et al.*, 1996).

According to the United Nations, literacy is an individual's ability to read and write a short simple statement about daily life (Hussey & Gilliland, 1989). Literacy, defined by the 1991 National Literacy Act, is "an individual's ability to read, write, and speak in English, and compute and solve problems at levels of proficiency necessary to function on the job and in society, to achieve one's goals, and develop one's knowledge and potential." The average adult reading ability in the United States lies between the eighth and ninth grade (Stedman & Kaestle, 1991). In general, adults read at least one or two grade levels below their last completed school grade (Zion & Aiman, 1989). Additional studies that compared reading levels to completed school grade levels indicate an overestimation of reading ability by an average of three to five grade levels (Hussey & Gilliland, 1989; Wilson, 1995).

Many have viewed the fundamental concept of reading ability to be based on "functional literacy" (Kirsch, *et al.*, 1993). Individuals who read at less than a fifth grade level are referred to as "functionally illiterate" (C. C. Doak *et al.*, 1996). The "functionally illiterate" term first appeared in a 1947 U.S. Census Bureau survey (Cook, 1977). Comprehension, understanding, interpreting, or using the content was found to be different from the ability to adequately read and write (Wilson, 1995) and functional literacy is not always related to intelligence (Davis *et al.*, 1998; Hussey & Gilliland, 1989).

Semi-Functional Literacy in the United States

National Adult Literacy Survey

By mid 1970s, a competency scale for reading skills and difficulty of written materials was developed. This new method of defining literacy emerged for functional literacy competency levels (Kirsch, *et al.*, 1993) that measured a person's ability to function over a range of difficulties in society. The 1992 National Adult Literacy Survey (NALS) established a scale for functional literacy (National Institute for Literacy, 1998). Functional literacy competency could then be measured by a multi-task literacy test (Kirsch *et al.*, 1993). Since grade level and functional competency skills measure different literacy criteria, they are not readily comparable. For example, NALS Level 1 fell below the fifth grade reading level and literacy tasks (C. C. Doak *et al.*, 1996).

The 1992 NALS reported that approximately 23% of the US population were functionally illiterate and another 30% had marginal skills (National Institute for Literacy, 1998). These data suggest that over one in five adults in the U.S. reads at the

fifth grade level and below or, in functional competency terms, at about NALS Level 1 (C. C. Doak *et al.*, 1996; National Institute for Literacy, 1998). The 23% of adult Americans found to be functionally illiterate lacked the ability to read either a newspaper or directions on a box of cake mix (C. C. Doak *et al.*, 1996). Further, NALS estimated that 47% of all adult Americans have poor reading and comprehension skills (National Institute for Literacy, 1998) and fail to understand most printed material in their daily environment (Gaston & Daniels, 1988).

Some researchers suggest caution when interpreting NALS data concerning equivalent reading grade levels. Due to a broad interpretation of the NALS data that indicated half of the American population is "illiterate" they warned that the indication was not truly representative of the accumulated NALS data (Barton, 1994; Sandra Smith, personal communication, February 2001) because NALS functional reading levels represent a very high level of reading function (Kirsch *et al.*, 1993).

Population Disparities

In the United States, the majority of adults with low literacy skills are white, native born Americans (National Institute for Literacy, 1998) although a disproportionate number of low literate individuals are associated by ethnic group and by age. For Americans age 65 or older and for inner city minorities, almost two of five read below the fifth grade level (at about NALS Level 1; see National Institute for Literacy, 1998) and nearly half of the elderly scored at the lowest level in the NALS (C. C. Doak *et al.*, 1996; Kirsch *et al.*, 1993; Williams *et al.*, 1995).

As literacy is considered a defining element of quality of life as well as a pivotal factor in the potential of our society, marginally literate adults usually find themselves

both culturally and economically disadvantaged in the milieu of written language. The effect of literacy on human capital development and poverty has long been established (Kirsch *et al.*, 1993). Of those adults who scored at NALS level 1 the NALS, 43% live in poverty. A minuscule 4% of those who scored at NALS Level 5 live in poverty (National Institute for Literacy, 1998). Those scoring at NALS Level 1 had a median income of $240/week while those at Level 5 had a median income of $681/week. The pattern of low literacy and limited opportunity is repeated itself in employment patterns, in that NALS Level 1 readers worked 19 weeks/year in contrast to Level 5 readers who worked 44 weeks/year (National Institute for Literacy, 1998).

Shame and Unseen Inadequate Literacy

Because adults with semi-functional reading skills often mimic literacy behaviors or bluff, the extent of literacy problems is often underestimated in America (Baker *et al.*, 1996). Research indicates that many educators frequently overestimate reading competencies for adult learners, particularly in limited resource audiences (Gaston & Daniels, 1988). Low literate adults learn to function in a literate society, learning to cope and thereby survive with their literacy handicap. Some hid their lack of literacy skills with even their closest contacts (Gaston & Daniels, 1988). Identifying semi-functional readers especially when they are concealing or cloaking their literacy status, remains a profound challenge to educators providing interventions to the public.

Parikh *et al.* (1996) studied the issue of shame in a sample of adults who had difficulty in reading. The study was administered to 202 acute care patients at a large public hospital in Atlanta, Georgia. The majority of the group was indigent African-American patients who had completed the Test of Functional Health Literacy in Adults

(TOFHLA) and answered questions on literacy skills and shame. Of the 58 patients who reported poor functional health literacy and admitted reading problems, 67.2% had never told their spouses and 19% of patients had never revealed their reading problems to anyone (Parikh *et al.*, 1996).

Beder (1991) challenged the concept of shame and low self-esteem for semi-functioning reading individuals and concluded they were stigmatized by myths about illiteracy. He asserts that those individuals are integrated members of our society, and that the stigmatization of association with illiteracy affects their participation in adult literacy education.

As reported by NALS, approximately 23% of American adults read at Level 1 (National Institute for Literacy, 1998). In Louisiana, about 28% of the adult population read at the NALS Level 1. Of Louisiana's 64 parishes, twenty-three parishes had 20 to 30% of their adult population at the NALS Level 1, thirty-seven had between 30 and 40%, and six parishes had 40% or greater of their adult population at this low level.

1991 National Literacy Act

Americans recognized the serious adult literacy problem in the United States and the U.S. Congress passed the National Literacy Act in 1991 in order to focus national attention on the literacy issues. This act addressed reading, writing, and speaking in the English language. By the standards of literacy defined by the act, an Italian physician, able to speak and write only in her native language, would be considered "illiterate" if visiting the United States. Adult literacy programs became a viable approach to solving adult low literacy. Unfortunately, studies indicate that less than 10% of those adults who might benefit from literacy education choose to

participate in programs (National Institute for Literacy, 1998; Venezky, Sabatini, Brooks, & Carino, 1996; Venezky & Wagner, 1996).

Inadequate Health Literacy

Health literacy has been defined as "having basic reading and numeracy skills required to function in the health care environment" (American Medical Association Council on Scientific Affairs, 1998; Parker, Baker, Williams, & Nurss, 1995). The American Medical Association (AMA) reports that adults with limited literacy often experience obstacles using health care. They struggle with understanding essential information such as consent forms, oral instructions, educational materials, and labels on medication containers (Williams *et al.*, 1995).

In one study regarding health literacy, C. C. Doak and L. G. Doak (1980) found that reading ability based on the Wide Range Achievement Test (WRAT), a word pronunciation and recognition test, was about four or five grades lower than the patient's highest indicated years of school. The TOFHLA indicates patient ability to read health related materials. Data from TOFHLA also suggest that a high proportion of patients cannot perform basic reading tasks (American Medical Association Council on Scientific Affairs, 1998; Parker *et al.*, 1995).

In a study of 1,892 English speaking minority patients at two public hospitals who were predominantly indigent, Williams *et al.* (1995), confirmed inadequate functional health literacy of patients. Using the TOFHLA, 35.1% of these patients had health literacy that was inadequate or marginally functional. Inadequate functional health literacy was found in 81.3% of elderly English speaking patients (60 years), a significantly higher percentage ($p<.001$) than that of the younger patients (Williams

et al., 1995). Gazmararian *et al.* (1999) found that in a national managed care organization, more than half of the elderly Medicare enrollees demonstrated inadequate health literacy. These findings are consistent with NALS findings that the elderly population has lower literacy skills than other age groups.

Gazmararian *et al.* (1999) studied 3,260 new Medicare enrollees aged 65 years or older with 2,956 (91%) of them speaking English as their native language. The prevalence of inadequate or marginal functional health literacy among English language individuals ranged from 26.8% to 44.0%. In multivariate analysis, factors such as age, occupation, study location, race/language, completed school years, occupation, and cognitive impairment were significantly associated with inadequate or marginal literacy. Reading ability also declined dramatically with age, even after marginal adjustments for number of school years completed and cognitive impairment. Higher rates of inadequate health literacy were associated with race, older age, completion of fewer school years, and a history of "blue collar" occupations ($p<.001$). Individuals who rated their health as fair/poor were twice as likely to have inadequate health literacy compared with individuals who rated their health as good/excellent (38.7% vs. 19.2%, respectively; $p<.001$), and individuals who had at least one chronic condition had slightly higher rates of inadequate health literacy than individuals with none of these conditions (25.8% vs. 22.1%, respectively; $p = .03$).

Health Care Costs and Health Literacy

In a study of low level readers in adult basic education classes, the 193 individuals with the lowest reading skills also had the poorest health, compared to those with higher reading skills (Weiss, Hart, McGee, & D'Estelle, 1992). Marwick (1997)

and Baker *et al.* (1997) also found that adults with low literacy skills had about two times the incidence of self-reported poor health problems than those with adequate literacy. Surprisingly, literacy was a stronger correlate of health status than the education level or other related social and economic variables (AMA Council on Scientific Affairs, 1998; Baker *et al.*, 1997). Early indications are that poor health literacy might be a correlate of the increase in hospitalization and higher health care costs. In a 2-year study of 958 limited resource patients, those with inadequate literacy were hospitalized at almost twice the rate of other patients, after adjustment for other health related factors (Baker, Parker, Williams, & Clark, 1998).

A 1999 Ad Hoc Committee on Health Literacy of the AMA reported a consensus that inadequate health literacy was common and was associated with poor health status (AMA Council on Scientific Affairs, 1998). The report suggests a likely association between increased health care costs and low literacy because patients with the greatest health care needs appear to have the lowest ability to read. Earlier research revealed no relationship between health literacy and health care costs. In 1994 Weiss questioned the relationship of poor literacy in adults and higher medical costs. Weiss studied 402 randomly selected adult Medicaid enrollees to investigate the relationship between literacy skills and health costs. Literacy skills were tested and health care costs were reviewed over a one-year period. The mean reading level of the Medicaid population was grade 5.6 and the mean annual health care costs were $4,574 per person, with no significant relationship between literacy and health costs. These differences may be attributed to health variations between the sample and the target population,

i.e., a vigorous immunization campaign to prevent influenza or differences in lifestyle and wellness practices between the groups.

Intended Readership and Health Education Materials

One study demonstrated that when reading levels of patients were measured, they were significantly lower than both the patients' stated years of education and readability of an educational pamphlet (French & Larrabee, 1999). Members of the AMA also observed that health education material, medical instructions, and self-report questionnaires were usually handed to patients with little regard as to whether they had any ability to read or comprehend them. Literate health educators possibly assume universal functional reading skills of patients (AMA Council on Scientific Affairs, 1998), thus overlooking a serious barrier to a patient's understanding of medical advice and health intervention. Only 32% of commonly used health education materials, including nutrition education materials, are understood by the majority of patients (Hilts & Krilyk, 1991).

Response to Inadequate Health Literacy

In 1993, the Joint Commission on the Accreditation of Healthcare Organizations (JCAHO) changed its standards on patient education. JCAHO accreditation was tied to patient "understanding" of provided information (Riffenburgh, 2000). Earlier standards required that patient education be given, but did not specify that it also had to be understood. The new 1993 requirement states that information must be given in such a way that it was understandable to the patient and the family (C. C. Doak *et al.* 1996; Riffenburgh, 2000). These new standards gave hospitals a more compelling reason to consider the reading and language needs of diverse patients.

The Health Literacy committee of the AMA recommended an increase in public awareness of health literacy and more emphasis on research on effective health education methods (AMA Council on Scientific Affairs, 1998). In recognizing the importance of this issue, the AMA created a new two hour self-study with continuing medical education credit for raising the awareness of physicians to the prevalence of low health literacy and its impact on patients (McIntosh, 2000). In response to the problem of health literacy competency, Davis, *et al.* (1991) developed and tested the Rapid Estimate of Adult Literacy in Medicine (REALM). The REALM estimates patient literacy and requires only three to five minutes to administer and score per patient (AMA Council on Scientific Affairs, 1998).

Pharmaceutical companies have also expressed concerns that patients with poor literacy and numeracy skills might have difficulties correctly taking certain medications and following directions (Estrada, Barnes, Collins, & Byrd, 1999). To improve comprehension of medication instruction, the Pharmacopoeia group (Ad Hoc Panel on Children and Medicines, 1998) developed 70 pictographs in a pictogram library to improve health-related information on drugs. These pictographs were well received by most, but some felt these detailed images might contribute to a mixed level of understanding for poor readers, and suggested that simple line drawings might prove superior (Jann Keenan, personal communication, November 5, 1999).

Adult Education Methods, Nutrition Education Programs, and Evaluations

Adult education theory provides guiding principles to influence learning and evaluation strategies (Boyle, 1981; Merriam & Cunningham, 1989). Andragogy is the process of the teaching of adults. The principles of andragogy, rather than pedagogy

(teaching youth), guide the development of the adult classroom. Areas for consideration for adult educators include existing student skills such as prior education, work related experience, literacy level, and multiple intelligence abilities: *i.e.* musician, artist.

Principles of Adult Learning

The principles of adult education provide the foundation for effective delivery models for adult nutrition education programs. When teaching adults, the goal of learning must be clear to the adult student. Adults tend to be self-directed learners, usually without a mandate to participate in the educational process. Success is a strong motivating force and occurs when the results are perceived to be possible, but not certain. Educators have a variety of methods and techniques to facilitate adult learning. Innovative teaching methods of adult educators and, specifically, Extension educators, provide the adult semi-functional reader with access to learning that is presented orally and/or in a manner less dependent on written materials. Many alternatives to written text instructional materials are available: role playing, simulations, demonstrations, panel discussions, question/answer sessions, games, interviews, songs, models, puppet mascots, audio tapes, video tapes, photos, drawings, and poetry. These techniques are less dependent on the written word and provide multiple avenues for various types of adult learners to grasp the intended message (Boyle, 1981; Merriam & Cunningham, 1989).

Cognition and Adult Learning

When planning the adult learning experience, the instructor considers the intellectual needs of the learner. Howard Gardner encouraged traditional educators to

look beyond the standard Intelligence Quotient (IQ) and consider other types of intelligence (Armstong, 1994; Gardner, 1983). D. Lazear (1991) extended multiple intelligence concepts by developing teaching methods to facilitate a more creative approach to teaching and learning.

Learners identified as handicapped, disadvantaged, or as having difficulty in succeeding in regular education programs without the aid of support services, instructional material, or equipment modifications, are considered special needs learners (Merriam & Cunningham, 1989) and adult semi-functional readers are considered handicapped learners. For low-income learners, special consideration is given to constraints including, but not limited to, low literacy skills.

Several laws directed at equal access to opportunities, like the 1963 Vocational Education Act, the Education for All Handicapped Children Act (1975), the Americans with Disabilities Act of 1990, and the Carl D. Perkins Vocational and Applied Technology Act of 1990 assure that special needs individuals received the same educational, employment, and fair access opportunities as other Americans. This legislation has been interpreted as a national mandate to enforce the rights of individuals with special needs and to provide equal access to public educational services to those with learning handicaps. Semi-functional readers are included within the population for which the mandate exists.

The principles of adult education offer community educators a well researched blueprint of the special needs of adult learners with marginal literacy competencies. Exemplary adult community programs of nutrition education have three primary components: educational design, implementation, and evaluation (Achterber, Van Horn,

Maretzki, Matheson, & Sylvester, 1994). Because no single best evaluation method is suitable for all learners, adult education evaluation encompasses diverse measurement strategies and activities to meet diverse learner capabilities (Merriam & Cunningham, 1989). Program reviews, continuous monitoring with process evaluations, and end-of-meeting reaction sheets or "exit surveys" are employed to answer the challenge of a diverse audience while adding flexibility to the evaluation process (Merriam & Cunningham, 1989).

To improve compatibility in measures of effectiveness, scientific standards of reliability and validity are being applied to adult education evaluation, and have become essential for instrument design. A third standard for evaluation instruments, a utility standard, determines the usability or practicality of the tool (Merriam & Cunningham, 1989). Timeliness, relevance, understandability, credibility, and usefulness are other factors that have been established as characteristics of effective evaluations (Rennekamp, 1999).

Nutrition Education Programs and Impact Evaluation

A variety of communication, educational, behavioral, and environmental nutrition education strategies were developed and continue to be developed on the basis of the appropriate use of theoretical frameworks (*i.e.*, the knowledge-attitude-behavior model; health belief model; social learning theory; marketing, social marketing, and social action models) to effect a change in nutrition related behaviors (Randell, 1995). Individual motivation, commitment, and self-efficacy are some of the elements considered when examining the social and personal impacts of nutrition education programs.

Measurement Objectives

Empirical studies conducted by the USDA provide a classic model for verifying program outcomes. Studies under the auspices of the national agency include randomized, controlled clinical trials where dramatic health change was observed and documented (USDA, 1995). Outcomes selected for nutrition education programs are often too global to measure accurately the effect of a program. Outcome evaluations may indicate the intervention was not successful, and the program being evaluated needed refinement or adjustment in delivery strategies. Since behavior change is often only modified over long periods of time, intermediate indicators, or process evaluation, help to determine whether progress has been made toward achieving stated program objectives. By measuring intermediate indicators, it is possible to identify those factors most important to behavior change, as a means to direct program focus (USDA, 1995). Outcome evaluations measure the observed change in target audience behavior. To be effective, nutrition evaluation strategies should be multidimensional and incorporate formative, process, and outcome evaluation research (USDA, 1995). In 1999 the Society for Nutrition Education (SNE) emphasized the need for nutrition education evaluation research and called for education targeting at risk groups, evaluation of education and communication methods, and development of innovative educational strategies.

Program Accountability

In the 1990s, USDA began integrating nutrition education into all of its food assistance programs (Food Nutrition Service [FNS], 2000). Verified food assistance program effectiveness was needed to assure federal stakeholders that resources were

spent "wisely" (USDA, 1995). Because the 1993 Government Performance Results Act (GPRA) encouraged an emphasis on impacts and outcomes of nutrition education programs, experts in the field subsequently began conducting ongoing investigations to identify effective strategies of nutrition education with the intent of incorporating those strategies into practice advances. Outcomes evaluation research strategies were encouraged to determine whether nutrition education alone could improve health or whether the integration of other strategies into nutrition education could improve health (USDA, 1995).

Another important concern is whether cost effective methods are being used to implement the federal government's standards in nutrition education (USDA, 1995). Program evaluation methods, including Group Evaluation System (GES), are being developed to address these concerns. Adult education methods provide diverse teaching and evaluation strategies to address these needs.

Sensitive to Learner

Evaluations, like interventions, should be designed with a purpose and a target audience in mind (USDA, 1995). A goal of nutrition education evaluation is to document intended program impact on clientele and, to do so appropriately, this implies an understanding of the client base. As stated previously, when nutrition education programs target adult limited resource audiences, the use of written evaluation instruments prove ineffective for semi-functional or marginal adult readers. Group administered measurement instruments are essential for evaluating nutrition education program impacts in the target audience but should be sensitive to the special needs of at-risk adult learners.

Developing a Nutrition Education Evaluation System with a Group Administered Instrument for Limited Resource Audiences

Guidelines for developing adult education evaluation materials for testing and measurement are well-documented (Boyle, 1981; Dean, 1994; Hohn, 1998; Merriam & Cunningham, 1989; U.S. Department of Education Office of Vocational and Adult Education, 1998; Venezky & Wagner, 1996; Wiersma & Jurs, 1990). Evaluation is a process that includes measurement and possible testing, but also implies the use of value judgments (Wiersma & Jurs, 1990). Wiersma and Jurs view assessment and measurement as synonymous terms. A "test" is a structured set of items or questions designed to be administered to individuals under specified conditions. Testing is considered the process of administering the test and measurement is data obtained by observing the test results. An evaluation system, constructed on these principles as it applies to adult education testing and measurement, could benefit nutrition educators working with adult limited resource audiences.

Nutrition education program outcome evaluations are used for many different purposes, one of which is to determine a participant's areas of strength and weakness (Wiersma & Jurs, 1990). Applying this idea to nutrition education, determination of a participant's nutrition knowledge and intended health behavior could facilitate program improvements to meet the stated objectives as well as to identify the specific needs of segments of the population. Meanwhile, other formats of tests could reveal program weaknesses and permit mid-program improvements and revisions (Rennekamp, 1999). Despite the plethora of literature on testing in general, group administered nutrition education testing instruments, sensitive to the special needs of at-risk adult learners -- specifically semi-functional readers -- are rare. Yet, such testing instruments are

essential to process evaluation and the need to respond to accountability driven evaluation of program impacts in target LSUAC adult limited resource audiences (Robert Richard, personal communication, March 1998).

Nutrition Education Evaluation Instrument Design

Excellent resources are available to educators and program managers which provide critical guidelines for developing nutrition education materials for low literate audiences (Macario *et al.*, 1998; Gayle Coleman, personal communication, October 21, 1999). "Writing for Reading: Guide for Developing Print Materials in Nutrition for Low Literacy Adults" written by Nitzke, Shaw, Pingree, and Voichick (1986) from the University of Wisconsin-Extension provides helpful information to educators developing low literacy instructional materials. In 1988, Gaston and Daniels compiled "Guidelines: Writing for Adults with Limited Reading Skills," that has also proved to be a reliable reference for many researchers.

Perkin (1992) provides an outline for developing nutrition research questionnaires in "Design and Use of Questionnaires in Research" published through the American Dietetic Association in Research: Successful Approaches. Perkin offered six steps to guide dietitians when conducting descriptive nutrition research using questionnaires: 1) conceptual model, 2) design and construction, 3) pre-testing, 4) administration, 5) analysis and reporting results, and 6) utilization of results to affect knowledge and action.

In 1994, the National Cancer Institute developed "Clear and Simple: Developing Effective Materials for Low-literate Readers," a user friendly reference and constructive aid for public health and health care educators. More recently, C. C. Doak *et al.* (1996)

developed an excellent resource for health educators, "Teaching Patients with Low Literacy Skills." In addition, L. G. Doak, C. C. Doak and Meade (1996) focused on cancer education in their publication "Strategies to Improve Cancer Education Materials."

An early and important concern of educators in addition to applicable goals and objectives for learning is awareness of the audiences' needs (Merriam & Cunningham, 1989). Adult limited resource audiences should be involved in the design and development process of low literacy materials with an assessment of needs establishing the specific purpose of the evaluation.

Establishing a Conceptual Framework

When designing an instrument, Perkin (1992) recommends that researchers and educators consider investigation goals and the types of instruments available to meet those goals. Coleman, Haas, and Himebauch (2000) also recommend viewing the evaluation instrument as a time and cost effective model. Educators suggest using existing materials for cost effectiveness and program continuity (USDA, 1995), while others maintain that simply revising the reading level of educational material to a lower reading level is an insufficient response to enhance learning in low literacy groups (Achterber *et al.*, 1994). Revising existing materials may not be cost effective for all studies and, following the implication of Achterber, Extension surveys should consider developing new materials specifically for lower literate audiences .

Tailored messages are designed to provide needed intervention information to those who are most at-risk (Sutton, Layden, & Haven., 1996). The communication, oriented to the consumer in a manner that the consumer can comprehend, is as

important as communicating the nutritional message itself. According to Sutton *et al.* (1995), this orientation of materials could be accomplished by segmenting and targeting consumers. The intended audience should be well defined and the message should be presented to that group in a personal and meaningful way. It is important that educators be aware that a single presentation could not attend the needs of every person in the public spectrum.

Targeting the audience's message is important (Shafer *et al.*, 1996; Derelian, 1995; Morreale & Schwartz, 1995; Sutton, Balch, & Lefebvre, 1995). For instance, computerized tailored messages designed to decrease fat intake and increase fruit consumption were found to be effective for promoting dietary fat reduction for disease prevention (Campbell *et al.*, 1994). Positive dietary changes are commonly reported in Expanded Food and Nutrition Education Program (EFNEP) program participants due in part to targeted nutrition messages delivered with effective strategies (Amstutz & Dixon, 1986).

Instrument Design and Construction

Mode of Administration

Written text based tests continue to be a common mode of evaluation of nutrition educators as this methodology is either economical to administer or the instructor is familiar with the methods, or both. Many types of tests are available for use by nutrition educators including: group tests, individual tests, written tests, oral tests, pretests, and posttests (Wiersma & Jurs, 1990). The type of test chosen should be consistent with the purpose and goals of the assessment. For instance, personalized evaluation methods providing direct contact between instructor and client, such as focus

groups and personal interviews, are commonly conducted with low literate individuals and audiences to overcome literacy barriers to written materials.

Because individual evaluation methods are labor intensive, the UMES instrument was found time efficient. The Learning Tool does not require instructors to complete forms individually (Coleman *et al.*, 2000). The uniqueness of the UMES instrument in this survey of literature serves to emphasize the rarity of tools available to evaluate programs directed toward adult limited resource audiences with semi-functional reading skills.

Researchers and educators are continually challenged to provide suitable low literacy educational materials within certain parameters since the cost of developing, testing, and producing a valid, reliable evaluation tool can be prohibitive for many public health education agencies (Achterber *et al.*, 1994). Similarly, the LSUAC has limited financial and human resources to available assess the impact of nutrition education programs upon adult limited resource marginally literate audiences.

Time, as always, is another limiting factor in program evaluations. Many adult educators, including LSUAC nutrition educators, commonly group administer a written evaluation instrument as a convenient measure of self-reported program impact. This, however, only introduce another variable as the testing and measurement skills of the instructor could become a serious limitation to the development of valid and reliable instruments. Moreover, the test length is often determined by practical constraints, such as fatigue limits or the attention span of respondents (Wiersma & Jurs, 1990). Other considerations include preparation time, duration, analysis, automation, and reporting adaptability to the existing evaluation system.

Objectives and Outcomes

Benjamin Bloom is well known to educators in the process of identifying teaching goals. His taxonomy of educational objectives contained major categories of cognitive domain, from knowledge through comprehension, application, and analysis, to the highest level, synthesis (Bloom, Engelhart, Furst, Walker, & Krathwohl, 1956). The cognitive domain of knowledge, considered the lowest level, simply requires that information be retained. Application, defined as the use of learned concepts in particular situations (Bloom *et al.*, 1956), is essential for new behaviors to become habitual (Shafer *et al.*, 1996; Sigman-Grant, 1996). In response to measuring changes in nutrition behaviors as a component of program impact, educators are able to adjust teaching methods. For the LSUAC FCS nutrition evaluation system, nutrition knowledge and intended behaviors are assessed with an "exit survey" instrument at the end of a lesson.

Text Source

In 1999, the staff of the Nutrition Project Division of FCS developed a "Home Economics Focus Area Evaluation System" (LSUAC CES, 1999a). This evaluation system consisted of written nutrition content evaluation statements established by a panel of nutrition education experts. These evaluation surveys focused on each of the five major areas within the Home Economics discipline, with approximately ten items per area. As an example, the LSUAC lesson on food safety provided three written items on food safety nutrition knowledge and seven intended health behavior items to made up the "exit survey" model LSUAC Evaluation Statements. With only minor

modifications (*i.e.*, "chicken" instead of "poultry") the LSUAC exit survey was adapted to the GES model.

Item Formats

Item formats for tests vary from essay to objective scored, depending on the specific purpose of the test (Wiersma & Jurs, 1990). Three popular formats are true false, multiple choice, and matching. The multiple choice format, in particular, offers special advantages because it may consist of a stem plus two or more option, requiring the learner to select the correct or the best option (Wiersma & Jurs, 1990), which can then be easily applied to a yes or no response format.

Response Formats

The LSUAC nutrition education evaluation system provided closed ended questions with categorical, multiple choice responses for the self-reported content statements. These responses were: "Yes," "No," "Already knew (do) it," and "Don't remember" or "Undecided." The use of the "Don't know" response has been studied (Perkin, 1992) and the conclusion was that inclusion or omission of the response should depend on the specific characteristics of the test. More items could be employed without an uncertainty response but an evaluation with fewer items possibly could prove more accurate if an uncertainty response was an option.

Graphic Illustrations

Pictorials or graphic illustrations facilitate comprehension and support the message (Gaston & Daniels, 1988). According to L. G. Doak *et al.* (1996), visuals are one of the "strongest opportunities" for enhancing a person's cognition and understanding at what they read. Photographs and line art keep a reader's interest and

are often remembered longer than words (Gaston & Daniels, 1988). In actuality, visual images are a language, and visual literacy may be defined as the ability to understand and produce meaningful visual messages. The term "visual literacy" was first used in 1950 by a photographer, Henry Holmes Smith, as he worked with filmstrips to tell a story (Beauchamp, 1998).

Since the early cave-drawings, visuals have been used to enhance learning and communications (Beauchamp, 1998). Due to a long history of pictorial applications in learning, public health education programs have successfully used pictorial lessons with semi-functional readers for recipe and cooking steps (Diane Linder, personal communication, February 2000). In 1998, the United States Pharmacopoeia (USP) Ad Hoc Committee on children and medicines considered pictographs to facilitate understanding of drug information.

Understanding the power of graphic illustrations, the UMES used an evaluation tool that employed pictorials for nutrition education. A pictorial format, known as the "Learning Tool," is utilized by the UMES to evaluate pre and post nutrition knowledge and behavior changes in low literacy audiences. As a visual component, "The Learning Tool" is found to be effective for adults with limited literacy skills because the pictorial format reinforced the concept of each statement as it was read by the instructors (Coleman *et al.*, 2000). The Learning Tool requires a pocket tool and a packet of cards were issued to each participant. Each card has a small black and white replica of the larger, full color illustration that the instructor displays when reading the evaluation behavior statement. The "Learning Tool," originally designed with 40 items, measures change over long-term participation, *i.e.*, a 6-month education cycle. The tool was

shortened and modified to better meet the needs of the clientele and the educators (Gayle Coleman, personal communication, June 16, 1999). The concept for designing pictorials for the GES has been patterned after the existing UMES evaluation method.

Illustrations may accompany text but always with a purpose in mind. They should emphasize, explain, or summarize the text (Gaston & Daniels, 1988). Similarly, the text should also support the pictorial presentations so the text gives meaning to the accompanying illustrations. Illustrations should be placed next to the related text (L. G. Doak *et al.*, 1996; Gaston & Daniels, 1988; Hand, 1982) and the illustrations should be kept simple (Gaston & Daniels, 1988).

Formatting for Reader Attention: Design and Layout

Because the educational material must be attractive to hold the attention of the learner (Gaston & Daniels, 1988), both the overall visual presentation and the written message are found to be important in developing useful and effective materials. A simple, uncluttered, and balanced layout of text, illustrations, and design features produce the best results. Gaston and Daniels suggested an "upside down" test is performed. If the material looked attractive upside down, it would be appealing to the readers.

Balanced illustrations and words with open background space allow the text and the graphics to "breathe." The ample use of white space and wide margins allow the work to easily read because the lesson is uncluttered. Good illustrations make the text more meaningful while the addition of numbers encouraged a logical progression to the message (Gaston & Daniels, 1988). Gaston and Daniels do not advocate the use of

lengthy lists because unskilled readers either have difficulty remembering listed items or become bored.

Language and Readability

Educators consider the language to be used for lessons and evaluations. Not only are foreign languages evaluated, but also Braille, sign language, and other language forms similar to pictures, that would be appropriate to the defined target population (Perkin, 1992). Visual language is understood by most individuals and is considered a resource for improving health education communications with the public (Debes & Williams, 1978). Readability and its impact on the reader have serious implications, which must be recognized by people who write health education materials (University of Utah Hospitals and Clinics Patient Education Clearing House, 1997).

As stated previously adults read at between an eighth or ninth grade level (Stedman & Kaestle, 1991) and research indicates all patients, regardless of skill level, prefer easy to read material. The National Work Group on Literacy and Health (NWGLH) suggested that all written communication for the public be aimed for a fifth grade level or lower (National Work Group on Literacy and Health, 1998).

Instrument Validity

Several types of validation exist and include content validity and the accuracy of the measurement scales. The measurements themselves are valid if the measurement process is accurate (Huck & Cormier, 1996). In addition to validity, usability is an important criterion. The usability of an instrument depends upon the cost, testing time, examiner training (Wiersma & Jurs, 1990), attitude, interest level, attractiveness, and

acceptance of the instrument by the individuals using the tool (Stephens, 1998; Wiersma & Jurs, 1990).

Learner Verification and Revision

L. G. Doak *et al.* (1996) recommends that health educators design questionnaires specific to the material being tested. The material for the intended readership should then be tested by a sample of the target audience. L. G. Doak also recommends interviewing focus group participants in order to provide systematic and reliable data. Once the development test data is collected, responsiveness can be examined and the instrument questionnaire revised. According to L. G. Doak, revisions should be qualitative, not quantitative, *i.e.*, if the main message is understood and errors continued, instrument revisions might not be cost effective. It is suggested that the instrument be redesigned when the pre-testing reveals significant measurement flaws.

Expert Panels

An instrument's content validity can be argued by a panel of experts who compare the components of the test against the objectives for the instrument's "claimed domain" (Huck & Cormier, 1996; Wiersma & Jurs, 1990). This is known as an expertise based evaluation (Joint Committee on Standards for Educational Evaluation, 1981). The subjective opinion of the panel establishes content validity of an instrument and no statistical procedures need to be applied (Huck & Cormier, 1996; Wiersma & Jurs, 1990). By conducting a nonstatistical content review before testing, researchers are able to conduct a quality control check to eliminate flawed items (Wiersma & Jurs, 1990). The content review by a panel of experts guards against item bias and potential

technical flaws whose members are knowledgeable about both the content area and the target audience.

Focus Groups

Focus groups (FG) are a qualitative method of data collection, using planned discussions to gain insights into the attitudes, perceptions, barriers, and opinions of a target population (Krueger, 1994; Nordstrom, Wilson, Kelsey, Maretzki, & Pitts, 2000; Reed, 1994) and are frequently used in nutrition related research studies. For example, researchers used focus groups to assess beliefs of older, rural Americans about nutrition education (Crockett, Heller, Merkel, & Peterson, 1990). Focus groups have also been used to obtain information from participants in the EFNEP regarding the development of programs targeting low literacy audiences (Hartman, McCarthy, Park, Schuster, & Kushi, 1994).

There are both strengths and limitations to FG methods. FGs are dynamic, giving the investigator an opportunity to document interactions among group members that otherwise might not be seen in one-on-one interviews. Limitations of FGs include decreased level of control by the facilitator, while tending to require more complex data analysis (Krueger, 1994). Germane to this study, intended readership focus groups are beneficial for learner verification and revisions of nutrition education low literacy materials (Achterber *et al.*, 1994; L. G. Doak *et al.*, 1996; Centers for Disease Control and Prevention, 1999). While FGs are a qualitative research methodology, and not projectile to any population, data collection by this method provides valuable insight into how the participant views the world and what the participant thinks, in this case,

about nutrition, diet, suitability of written text, and graphic illustrations (Sutton *et al.*, 1996).

Estimated Instrument Reliability

Instrument reliability analysis calculates internal consistency or reliability of the scales, based on the average inter-item correlation for all scale variables (Ary, Jacobs, & Razavieh, 1996; M. D. Gall, Borg, & J. P.Gall, 1996; Gravetter & Wallnau 1996; Huck, & Cormier, 1996; Trochim, 1999). Statistics are reported for the number of cases, the number of items, and the coefficient alpha for reliability estimates. For reliability measures, data may be dichotomous, ordinal, or interval, but must be coded numerically and the observations must be independent (Ary *et al.*, 1996). When categorical or nominal data are collected, simple percentages based on frequencies may provide measurements meaningful for the intended use (Gravetter & Wallnau, 1996). Categorical or nominal data may be used to represent the entire distribution in a frequency distribution table, as in a bar graph or to summarize the central tendency with the mode (Gravetter & Wallnau, 1996).

METHODOLOGY AND RESULTS

Group Evaluation System Theory Model

Existing adult and nutrition education conceptual framework provided the primary theoretical proposition for the study. The special needs of adult semi-functional reading audiences influence group methods used to evaluate nutrition education program impact. The theoretical framework for this study includes nine major components: (1) adult limited resource audiences, (2) effects of nutrition education on health, (3) the need for nutrition education, (4) selected adult nutrition education programs, (5) the need for nutrition education program accountability, (6) challenges to accountability, (7) theory of adult and nutrition education; (8) nutrition education evaluation; and (9) instrument development (Figure 1).

Research Design Overview and Study Objectives

The foregoing literature review provided both a validation and methodological framework for using graphic illustrations and oral language to enrich the comprehension of written text and to support the following research hypothesis and five study objectives.

Hypothesis: A group evaluation system (GES) will provide valid and reliable measures of nutrition education program impact in adult limited resource audiences with diverse literacy skills.

In designing the GES, the instrument constructs, scales construction, item generation, data collection, analysis, instrument validity, and estimated reliability were considered (Perkin, 1992). Five study objectives were identified within a research framework of four phases shown in Table 1 on the GES Research Model to conform

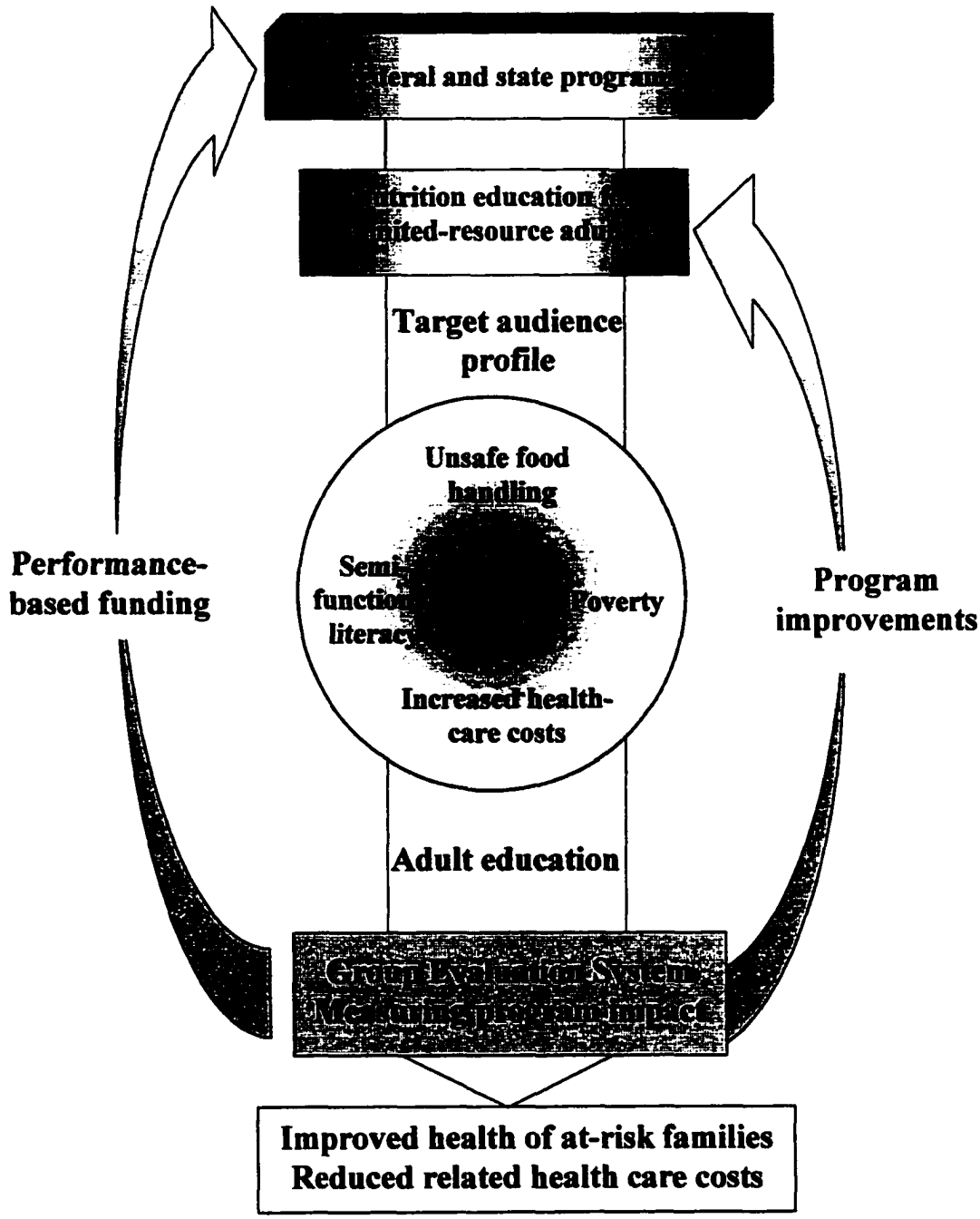

Figure 1. Group Evaluation System Theory Model. Influence of measuring nutrition education program impact in marginally literate adults on health of at-risk families, related health care costs, program improvement, and performance-based funding.

with four phases of procedural steps adapted from methods presented by Perkin in "Design and Use of Questionnaires in Research" in the American Dietetic Association's Research, "Successful Approaches."

In Phase I, instrument design and construction, language, graphic images, and readability were considered (Table 1). A response format was chosen and question placement and instrument length were decided. Objective 1 addressed the instrument development phase of the study.

Objective 1. To develop an instrument for evaluating the effectiveness of a Cooperative Extension nutrition education instructional program that can be used accurately with adult limited resource program participants with diverse literacy skills.

During Phase II, GES validity and instrument refinement, a panel of experts and two target audience focus groups (FG) assessed the content validity of the instrument. Suggestions were incorporated into modifications and revisions. Objectives 2 and 3 refer to content validity for specific target groups.

Objective 2. To establish the content validity of the instructional program evaluation instrument for use with adult participants who were adult semi-functional readers.

Objective 3. To establish the content validity of the instructional program evaluation instrument for use with adult participants who were functional readers.

In Phase III, GES estimated reliability and data collection, a brief nutrition education lesson was conducted with a convenience sample of the target audience

Table 1

Group Evaluation System Research Model

Procedures
Phase I: Instrument Development
Conceptualize design
Mode of administration
Question construction: Text and graphic illustrations (pictorials)
Response formats
Instrument length
Baseline and intermediate reading level
Question placement
Design visualization
Phase II: Validity and Instrument Refinement
Expert panel: Item Rating Scale
Target audience focus groups: Adult semi-functional and functional readers
Group Evaluation System instrument modifications
Final reading level
Phase III: Estimated Reliability
Preparing the nutrition education lesson
Group administering the Group Evaluation System instrument
Individually administering the oral interviews
Phase IV: Data Analysis
Measuring the agreement between Group Evaluation System and interview responses
Group Evaluation System revisions

followed by two successive tests. First, the GES instrument, with written and spoken language, food-related graphic illustrations and symbols, was group administered to the target audience. Then, each participant was personally interviewed with the same survey items. Objective 4 addressed instrument reliability.

Objective 4. To estimate the reliability of the instructional program evaluation instrument by determining the level of agreement between the responses from the group administered format and the personal interview.

Finally, in Phase IV, data analysis, both qualitative and quantitative data were examined and summarized. Objective 5 provided criteria on instrument reliability for the scope of this study.

Objective 5. To achieve a 70% agreement between the group administered format and the interview or, failing to achieve this threshold agreement initially, to identify and implement revisions to the instrument to improve the estimated reliability.

Phase I: Instrument Design and Construction

Objective 1 sought to develop an instrument for evaluating the effectiveness of a Cooperative Extension nutrition education instructional program that could be used accurately with adult limited resource program participants with diverse literacy skills. To fulfill the requirements of objective 1, the following steps were conducted.

Conceptualization

The Louisiana State University Agricultural Center (LSUAC) Family and Consumer Sciences (FCS) "Home Economics Focus Area Evaluation System" uses an exit survey evaluation format. Research supported these exit surveys as a method of

evaluation that is convenient and labor saving when measuring short term, self-reported, perceived program impact (Merriam & Cunningham, 1989). The existing LSUAC FCS evaluation system for nutrition education curricula was examined for identification of criteria to guide the GES development. Total compatibility with statewide FCS data collection and web based electronic reporting would permit inclusion of GES data when compiling program data (Robert Richard, personal communication, March 1998). Following this review of existing LSUAC FCS evaluation methods, conceptualization of the GES was based on the following criteria: a) compatibility with LSUAC data collection methods; b) efficiency, ease of administration to a wide range of adult audiences, ease of scoring and analysis; c) the potential to accommodate a variety of curriculum topics with a standardized format; d) economy of administration; e) the ability to deliver audience specific data to decision makers for program improvement; and f) ease of incorporation of existing materials where possible.

Design and Construction

The next step in developing the questionnaire was to design and construct the instrument by establishing the mode of administration, question construction, and instrument length while considering readability and graphic illustrations, and layout format. During this process, two evaluation methods were consolidated. An existing LSUAC FCS program evaluation system that was a collection of predetermined evaluation statements was utilized. The "Home Economics Focus Area Evaluation System" used an exit survey (Appendix A) format with closed-ended responses for approximately 10 written items (LSUAC CES, 1999a). Another existing program from the University of Michigan Extension Service (UMES) employed a nutrition education

evaluation conceptual model that successfully combined a pictorial, text, and oral group evaluation (Coleman *et al.*, 2000). As a pre post test format requiring class enrollment, it covered several topics written specifically for the UMES curriculum, "Eating Right is Basic" (3rd ed.) but was considered lengthy with 40 items (Achterber *et al.*, 1994). The brief exit survey format with 10 items, using the existing LSUAC evaluation statements, and both the pictorial and oral methods from the UMES were combined for the GES.

Mode of Administration

As a post-test evaluation tool, administering the GES followed a specific nutrition education lesson. For the benefit of adult semi-functional readers, the instructor read the instructions and the questions aloud and simultaneously showed an associated food-related graphic illustration that matched a corresponding graphic illustration on the GES instrument. Once participants matched the displayed graphic illustration to an identical graphic illustration on the evaluation instrument, the instructor read the response choices aloud and indicated the corresponding symbols. Participants then self-selected the desired response to the item.

Written-Oral Language Instrument

A written evaluation instrument, accompanied by oral language, satisfied criteria for inclusion of adult semi-functional and functional readers in a group evaluation setting. It was convenient and time efficient for the instructor to read the instructions and questions of the instrument aloud to the whole group as compared to providing personal assistance to individuals, conducting interviews, or directing a focus group. The research finding that lent support to the concept of oral readings was stated

previously in the work by the UMES with the "Learning Tool" (Coleman *et al.*, 2000; Haas, Himebauch, & Coleman, 1997).

Question Construction

The topic of food safety was chosen for this study because, with few exceptions, the same national food safety recommendations are applicable to most adults regardless of age or gender. By selecting a food safety topic, a uniform lesson content was provided to all study groups which precluded customizing specific nutrient requirement information for special audiences. For example, a lesson on the Food Guide Pyramid frequently requires the instructor to tailor the lesson (and the evaluation instrument) to the specific nutritional needs of the audience. A lesson would be slightly different for pregnant teens and senior citizens. This potential GES testing variation was averted by selecting a food safety lesson that was static for most audiences.

The GES instrument was constructed with the intent that the food safety evaluation statements and the responses closely resembled the original FCS statements *i.e.*, "As a result of what I learned, I will wash my hands with hot, soapy water before handling food and after using the bathroom, changing diapers, and handling pets" (Appendices B and C). Following a close examination of the FCS food safety item stems, some had multiple components, *i.e.*, "As a result of what I learned, I will wash my hands with hot, soapy water before handling food and after using the bathroom, changing diapers and handling pets" (LSUAC CES, 1999a). These multiple components were not changed for the GES Instrument (Version 1) mock up, as it was intended that the text for the food safety evaluation statements and responses should closely resemble the original FCS statements. Testing and measurement literature

indicates that multi component items might be ambiguous and contribute to confusion in testing (Trochim, 1999; Wiersma & Jurs, 1990) but, for the sake of compatibility and future researchers, the original format was retained.

Since evaluation materials should be developed to accommodate a specific curriculum (L. G. Doak *et. al.* 1996), existing LSUAC evaluation items were readily available on the food safety topic and were considered for this study to conserve limited financial and human resources when designing evaluation materials (U.S. Department of Agriculture [USDA], 1995). To accomplish Study Objective 1, an LSUAC nutrition education lesson on food safety was selected, planned, and adopted for testing. Specifically, the LSUAC FCS Nutrition, Diet, and Health base program objective on food safety was used to develop GES written evaluation statements. The Family Nutrition Program (FNP) "Fight BAC!® Make Food Safety a Habit" lesson was developed by the LSUAC with permission from the Partnership for Food Safety Education (Appendix B). Ten existing food safety evaluation statements met the development criteria and were adapted for the GES during development (LSUAC CES, 1999a). Three items evaluated nutrition knowledge and correlated with three response choices. The seven remaining items measured intended behavior and were accompanied by four response choices.

Response Formats

Categorical responses for the GES food safety instrument were modeled from FCS evaluation statements and responses. Response choices were not consistent and differed in three of the ten statements. An additional response choice was included in the GES instrument (Version 1) for consistency with the four behavior change

responses (Appendix B). The following response format was used for the GES instrument (Version 1) and was consistent with the LSUAC FCS evaluation system.

Today I learned what can cause foodborne illness.

Yes No Already knew it Don't remember

As a result of what I learned, I will wash my hands with hot, soapy water before handling food and after using the bathroom, changing diapers and handling pets.

Yes No Already doing it Undecided

Symbols were added to the categorical responses to provide a visual language cue for adult semi-functional readers. Symbols as simplified graphic illustrations (Houts *et al.*, 1998; National Cancer Institute, 1994; Rymes-Barley, 1989; U.S. Department of Health and Human Services [US DHHS], 1994), were identified when the response choices were read aloud by the instructor. A check mark symbol was positioned above the "Yes" response, an "X" above the "No," a star above the "Already knew (or do) it," and a question mark above the "Undecided" response to aid visual communication to adult semi-functional readers, as suggested by research supporting graphic illustrations for this purpose. Experts recommend using "universal" symbols, as an "X," a stop sign, or an arrow, to improve comprehension of low literacy, health education materials (National Cancer Institute, 1994).

The inclusion of a "Don't know" response (Perkin, 1992; Poe, Seeman, McLaughlin, Mehl, & Dietz, 1988) is known to be a potential limitation of the test and was explored in the expert panel and focus groups data collection and analysis. As indicated by Wiersma and Jurs (1990), two positive response choices were available which could lead to confusion between them. GES responses were single option

variables and the respondent was to circle an item as a request for only one answer (Trochim, 1999).

Instrument Length

Evaluation question length is an important variable (Gaston & Daniels, 1988; Kenji Kitao & Kitao, 1999). Ten items were selected for the GES food safety instrument, consistent in length with the "exit survey" model developed by LSUAC FCS. The concept of a brief evaluation instrument is supported in the research by Coleman *et al.* (2000), who states that an instrument should be presented with a low "respondent burden" for clients with low literacy skills. Once finalized, the GES food safety instrument was three 8.5 x 11 inch pages: one cover page with instructions and sample items, and two pages of the evaluation items.

Language, Readability, and Graphic Illustrations

Reading difficulty of the written text was measured at three intervals during development: a) Baseline, b) GES Instrument (Version 1), and c) GES Instrument (Version 2). Microsoft Word 97 computer program (Soft-Art, Inc., 1997) was used in determining baseline readability of the LSUAC food safety evaluation statements. A score of 60-70 is the standard reading ease level and a grade level score of 6-10 is considered the most effective for general audiences but adult semi-functional readers tend to score below the fifth grade level (C. C. Doak *et al.*, 1996). The GES Instrument Version 1 and Version 2 was 65.0, 68.2, and 68.0 for the Flesch Reading Ease and 7.9, 8.4, and 8.3 respectively for the Flesch-Kincaid Grade Level Intervals (Appendix D). The Flesch Reading Ease and the Flesch-Kincaid Grade Level increased from baseline measures. Readability for all measures was near the eighth grade reading skill level.

Research indicates CES mass mailing written material is written at a mean readability grade level of 11.2, or just above the 11th grade (Johnson & Verma, 1992). The scientific nature of the topics may explain some of the reading difficulty of these materials (Stephens, 1998; Zion & Aiman, 1989).

Food-Related Graphic Illustrations

The GES instrument was patterned after an evaluation concept from the UMES "Learning Tool" (Haas *et al.*, 1997) and was used with permission (Gayle Coleman, personal communication, September 16, 1999). Existing food related graphic illustrations from two Extension service sources: the UMES Pocket Tool (Coleman *et al.*, 2000) and from the LSUAC FNP food safety lesson (Alley, Seals, & Wilson, 1998) were deemed appropriate for this study. Food-related graphic illustrations were identified and then reduced to 1.5 x 2 inches. By reducing large images to a smaller size, some graphic illustrations lost quality, became difficult to discern, and required graphic adjustments to maintain the interpretive integrity of the image. Identical graphic illustrations were developed, the small version for the evaluation instrument and a larger one to be displayed on an 11 x 17-inch flip chart. Line drawings met the GES instrument design needs and were superior to complex images, confirming recommendations of Gaston & Daniels (1988) and Houts *et al.* (1998).

Text and Graphic Illustration Layout

Question order, although an important component of instrument design (Trochim, 1999), was not changed from that of the original FCS statement document. Small, 1.5 x 2 inch graphic illustrations were positioned one inch from the left page

margin next to the associated GES text. Numerals 1 through 10 preceded questions and the four response choices with symbols were placed below each question (Appendix E).

The text and associated graphic illustrations for the 10 items resulted in two pages, in an 8.5 x 11 inch format that included graphic illustrations, text, and responses. User instructions were added on a third page, the cover sheet. Simple written instructions on using the GES instrument were provided for adults with functional reading skills, which would allow those participants a measure of autonomy. A sample of the evaluation statements together with the response choices was included on the instruction sheet to allow the participants to become familiar with the testing format and procedures. A sample of two different sets of item response formats, their accompanying four response choices, and corresponding symbols were positioned on the cover page, but sample graphic illustrations were purposely omitted.

The GES layout was formatted on 8.5 x 11 inch paper, text was set in easy-to-read 16 point, Times New Roman font (AMC Cancer Research Center and Centers for Disease Control and Prevention, 1994; Gaston & Daniels, 1988; White, 1988). By using a standard paper size and black imaging, the GES was economically reproduced on an office copier.

Since white space in a document is important for adult semi-functional readers (AMC Cancer Research Center, 1994; Gaston & Daniels, 1988), 1 inch mirror page margins were used, with spacing as permitted by the length of the item. Based on the literature, the use of white space was maximized to aid adult semi-functional readers. Placing the graphic next to the text was supported by research. The text, related graphic

illustrations, responses, and symbols were "boxed in" with a line border in the instrument mock up, as suggested by Gaston and Daniels (1988).

Phase II: Validity and Instrument Refinement

To accomplish objectives 2 and 3 the following methodology was conducted. Three groups, totaling 28 individuals, contributed recommendations to refine the GES instrument (Version I). The content validity was established through a panel of experts (Joint Committee on Standards for Educational Evaluation, 1994; National Cancer Institute, 1994; Wiersma & Jurs, 1990) and two target audience FGs (Macario, *et al.*, 1986; Reed, 1994; Sutton *et al.*, 1996). FG members were representatives from the target audience who were adult semi-functional or functional readers (Krueger, 1994; Sutton *et al.*, 1996). The content validity was assessed and the instrument was revised and modified based on recommendations from these groups.

Group Evaluation System Item Rating Scale

The expert panel was asked to review the food safety evaluation instrument's directions, text, associated food-related graphic illustrations, responses, and symbols. They were instructed to rate the items for congruity with the following stated food safety objective: Louisiana residents and food handlers will improve food safety by controlling or eliminating foodborne risk (LSUAC CES, 1999a). A structured GES Item Rating Scale (Appendix F) was designed for that purpose (Wiersma & Jurs, 1990).

By using a GES Item Rating Scale, the panel was potentially able to address each evaluation item with the same degree of attention. Items were rated on a 5-point integer scale from 1 (poor) to 5 (excellent), which allowed the ratings from the panel members to be compared and averaged. Comments about each item were requested

(Wiersma & Jurs, 1990). Structured rating scales were recommended for use with expert panels (Joint Committee on Standards for Educational Evaluation, 1994; Wiersma & Jurs, 1990).

Expert Panel

Quantitative data collection for the validity assessment began in June 2000. Twelve experts were identified as representing the fields of nutrition education, program evaluation, adult literacy, and instrument design. Their areas of expertise, titles, and contact information were documented. Experts considered the appropriateness of the instrument for the adult semi-functional and functional readers and evaluated the food safety constructs with the stated objective of the instrument. To recruit members, potential members received a letter of introduction describing the research and requesting their participation as experts to validate the content of the GES instrument (Appendix G).

A cover letter, the GES instrument (Version 1), and the GES Item Rating Scale, were included in the GES packet delivered to the 10 panelists agreeing to participate (Appendices H, E, and F, respectively). Members of the expert panel were asked to review the GES and rate how well the evaluation items matched the stated objective. Also, in these materials was a brief Expert Panel Information Form that profiled selected characteristics of the panel members and included the following: field of expertise with years of experience, educational level, organization, and gender (Appendix I).

Since the panelists requested they work independently and not come together in a group as was originally planned, panelists were encouraged to communicate with staff

during the assessment to clarify questions. Ten of the 12 invited panelists participated, although only 8 returned the completed GES Item Rating Scale. The 8 females (80%) and 2 males (20%) on the panel had extensive experience in adult education, ranging from 2 to 32 years. Two panelists were Registered Dietitians with community nutrition education experience (20%) and 4 (40%) were nutritionists, indicating they had worked with both the LSUAC FNP and Expanded Food and Nutrition Education program (EFNEP). Table 2 shows the expert panel gender, titles, organizations, highest degree, and credentials.

Ratings and Recommendations

The panelists were provided a choice of five anchored scale responses: 1 (poor), 2 (weak), 3 (average), 4 (good), and 5 (excellent). Numerical ratings allowed item measurements to be compared and averaged for the eight panelists (80%) who completed the rating scale. The assessments of the panelists were submitted independently. Table 3 presents the GES Item Rating Scale Results.

Item rating scores for panelists were combined to calculate means, which ranged from 3.30 to 5.00. When ratings for items 1 – 10 were averaged, the means for item 2 (3.75) and items 3 and 4 (4.63) ranged 0.88 points. A composite score of 4.25 indicated the GES achieved an overall slightly better than "good" numerical validity rating from the expert panel based on the scale the panelists were provided.

As previously stated, 2 of the 10 panelists did not complete the GES Item Rating Scale but, rather, chose to comment extensively on the GES instrument. These comments were reviewed, documented, and incorporated into the comments from

Table 2

Expert Panel Gender, Titles, Organizations, Education, and Credentials

Demographics	n	%	Description
Gender	2	20%	Male
	8	80%	Female
Total	10	100%	
Titles	7	70%	Extension Specialists
	1	10%	Professor
	1	10%	Literacy Educator
	1	10%	Adult Educator
Total	10	100%	
Organization	6	60%	LSU AgCenter
	1	10%	Louisiana Department of Adult Education
	1	10%	School of Human Ecology
	1	10%	Southern University
	1	10%	Operation Upgrade Literacy Program
Total	10	100%	
Highest degree	8	80%	Ph.D.
	1	10%	M.S.
	1	10%	B.S.
Total	10	100%	
Experience	10	100%	2 – 32 Years range
Credentials	2	20%	Registered Dietitians
	4	40%	Nutritionists
	3	30%	Specialists in Food Safety
	8	80%	Educator in Limited Resource Audience
	2	20%	Educator in Curriculum Development
	6	60%	Experience in Basic Literacy
	1	10%	Teacher in High School
	1	10%	Instructor of English as a Second Language
	1	10%	Instructor in Graduate Equivalence Exam
	1	10%	Member of Governor's State Literacy Committee
	1	10%	Past Advisor to Louisiana Family Community
	1	10%	Researcher in Literacy
	1	10%	Volunteer for Reading is Fundamental

Table 3

Group Evaluation System Food Safety Evaluation Instrument Item Rating Scale Results

	Item											
Panelist	**One**	**Two**	**Three**	**Four**	**Five**	**Six**	**Seven**	**Eight**	**Nine**	**Ten**	**Mean**	**SD**
A	2	4	5	5	5	4	5	5	4	3	4.20	1.03
B	4	4	4	3	3	3	3	3	3	3	3.30	0.48
C	4	4	4	4	4	4	4	4	4	4	4.00	-
D	5	5	5	5	5	5	5	5	5	5	5.00	-
E	5	5	5	5	5	5	5	5	5	5	5.00	-
F	3	3	5	5	4	3	2	3	4	4	3.60	0.97
G	4	4	5	5	5	5	5	5	4	5	4.70	0.48
H	5	1	4	5	4	5	5	5	4	4	4.20	1.23
Mean	4.00	3.75	4.63	4.63	4.38	4.25	4.25	4.38	4.13	4.13	4.25	0.27
SD	1.07	1.28	0.52	0.74	0.74	0.89	1.16	0.92	0.64	0.83		

other panelists. The expert panel reported the GES items had content validity for measuring food safety program outcome data for both adult semi-functional and functional readers. Suggestions from the group included improving graphics to match the message more closely, supporting the importance of using the graphics for all participants, offering an alternative term for "foodborne illness," and shortening the sentences by deleting the multiple question stems. A summary of the themes of the comments and recommendations from the expert panel about each GES item is presented in Appendix J.

Target Audience Focus Groups

Two focus groups were conducted with target audience representatives to guide the development of the GES (Krueger, 1994; Sutton *et al.*, 1996). Krueger and others support using audience specific focus groups to assess the practicality of materials (Hartman *et al.*, 1994; Kenji. Kitao & Kitao, 1999; Krueger, 1994; Stephens, 1998). The FG assessed the validity of the GES food safety directions for items, text, associated graphic illustrations, responses, and symbols for use with adult semi-functional and functional readers. Reviewing each of the 10 GES items, the FG members were to identify words, concepts, or images that were difficult or proved to be a barrier to understanding. To insure that the GES was appropriate for adult semi-functional readers, a FG was conducted with participants who were identified as being adult semi-functional readers by a collaborating agency from their past programming experience. Some members of this targeted group are reported to have rudimentary reading skills, but below a functional reading level (C. C. Doak *et al.*, 1996; Gaston & Daniels, 1988; Gazmararian *et al.*, 1999).

FCS agents and agency staff also identified adults who were considered functionally literate and, as reflected in the literature, assumed to possess a minimum of fifth grade reading skills (National Work Group on Literacy and Health, 1998). It was judged that some members of the functional reader group were able to complete the written food safety evaluation survey without the aid of the associated graphic illustrations. Both FGs followed similar procedures as indicated in the subsequent discussion. Informed consent (Appendix L) was obtained (Ary *et al*, 1996).

Collaborating Agencies

Collaborating agencies and LSUAC FCS agents assisted with locating FG participants. A letter of introduction was sent to potential collaborating agencies (Appendix K). This communication described the research project, a request for their agency and clientele's participation in the FG and an outline of the responsibilities for participation. Following a brief time lapse of a day or two, staff members responded and accepted or declined study participation.

Once the community groups were identified, the GES instrument (Version 1), the Human Subjects Consent Form, the Focus Group Demographics Form, the Focus Group Meeting Logistics Form, and a guiding list of questions were prepared for use (Appendices E, L, M, N, and O, respectively). A two page written survey was developed to gather information on the FG members' age, ethnicity, educational level, employment status, literacy skill, and public assistance participation status (Appendix M).

Focus Group Questions

The FGs were guided by eight structured questions on instrument development, as suggested by Krueger (1998b). The questions obtained information regarding the acceptance of the instrument, the difficulty of the text and images any barriers to understanding and obstacles in implementation of the lesson for FG clientele (Appendix O). For example, questions included were: "What did the question mean to you? Was it easy or hard to answer?" (Krueger, 1998b). FG questions were prepared to facilitate the group and, as recommended, were used with audiences that were least familiar with the research process. The findings of the FG contributed to modifications to improve

the food-related graphic illustrations and content statements for adult semi-functional reading adults.

The instructor read aloud the eight questions for each of the 10 GES evaluation items. These questions explored personal comprehension of the written (or orally delivered) statements, and were designed to exclude factors unrelated to the purpose of the measurement in this study, *i.e.*, math skill or reading ability (Ary *et al.*, 1996). The FG members examined the content validity and practical usability of the GES, and their perceptions were explored as the sequenced questions were read aloud. Research assistants, who were trained to support the investigation and to document themes and comments of the panel, were present (Krueger, 1998b). Training consisted of reviewing the focus group procedures, along with assigned individual tasks. The necessary materials were provided and a brief role playing of a focus group was conducted to verify documentation skills. Members' responses to the questions during the groups were documented with two audiocassette voice recorders located in the meeting rooms, as well as research assistants who documented members' comments during the sessions.

Conducting the Focus Groups

Each FG lasted for approximately 60 minutes. This length of time was adequate for accomplishing the purpose of this study. The Human Subjects Consent Form, which the participants completed, was read aloud and collected by the research assistants. Assistance was provided where needed. A copy of the signed consent was given to each participant. The Focus Group Characteristics Form was then distributed and completed by group members, with assistance where needed, to obtain demographic data.

Light refreshments were provided, introductions were given, and the FG procedures were explained. Each participant received a modest honorarium of a small brown bag containing a clear, 5-ounce reusable, plastic, food storage container, which was selected to support the food safety lesson concepts. The target audience expressed appreciation and value for the food storage container as an honorarium, and this item was later considered when determining the honorarium for the pretest phase of the study.

Included with these materials was a printed, self stick label identifying a common, household sanitizing solution. The bleach recipe and sanitizing information was part of the food safety subject content. The recipe for the household sanitizing solution was simple: one teaspoon of bleach to be mixed with one quart of water. Members were encouraged to prepare the weak bleach solution at home and to store it in an inexpensive (about 98 cents) quart (32 oz.) spray bottle container.

In view of the group, the agency staff was presented with a gift of appreciation for assisting with convening and conducting the group -- an empty quart spray bottle labeled with the Sanitizing Solution Recipe. By having an assembled sanitizing spray bottle to show, two concepts were visually communicated to the group: the size or volume of a quart container and the simplicity of using an economical sanitizing solution in a spray bottle to improve food safety in their homes.

The food safety lesson was not presented to the FGs in order to maintain the primary focus on the evaluation of the GES instrument. All of the food safety lesson teaching materials were brought to the study site, prominently displayed, and described in detail to both FGs to explain the classroom setting for the GES evaluation set-up

(Appendix C). Following a brief introduction, the GES for the food safety lesson was distributed to the FG with an explanation of the study's interest in facilitating learning by using pictures.

Target Audience Focus Group: Adult Semi-Functional Readers

Objective 2 was to establish the content validity of the instructional program evaluation instrument for use with adult participants who were adult semi-functional readers. Ten adults who were enrolled in an urban community literacy class were identified as adult semi-functional readers and participated in this group. Locating pre-existing groups of adult semi-functional readers was more difficult than anticipated because literacy instruction usually occurs on an individual basis.

Results for Target Audience Focus Group: Adult Semi-Functional Readers

Of the 10 limited resource, adult semi-functional readers in the first FG, four were male (40%) and six were female (60%), with ages ranging from 27 to 75, and with the mean age of 48.60 (S.D. = 17.00). FG demographics reflected the food stamp population for gender and race in the FNP audience (LSUAC CES, 2000). The adult semi-functional reader FG reported Ethnicity: eight black (80%), two white (20%), Educational level: one (10%) third grade, one (10%) fourth grade, two (20%) to eighth grade, two (20%) through ninth grade, two (20%) through eleventh grade, one (10%) had military training, and one (10%) had job training.

To appraise the group reading skill in a non-confronting manner, a self-reporting scale was provided to members. The scale listed four progressive levels of estimated ability to read a newspaper (C. C. Doak *et al.*, 1996). The reading skill categories were: "can read a newspaper," "can read most words in a newspaper," "can read a few words

in a newspaper," and "cannot read a newspaper." Newspapers are a common reading ability reference and customarily aim for about an eighth grade reading level (C. C. Doak *et al.*, 1996; Stedman & Kaestle, 1991). Literacy skills (ability to read a newspaper) for adult semi-functional readers are estimated to be below the fifth grade level (National Work Group on Literacy and Health, 1998). Literacy skill for the adult semi-functional reader group was self-reported as: two members (20%) said they could read a newspaper, four (40%) indicated they could read a few words in the newspaper, and four (40%) indicated they could not read the newspaper. Participation in public assistance programs was reported as three members (30%) receiving food stamps; six (60%) receiving social security; one (10%) receiving food commodities; and none indicated Temporary Assistance for Needy Families (TANF), Women, Infants, and Children (WIC), or Head Start. Additional characteristics of the adult semi-functional reader FG members are found in Appendix P.

Participant remarks reflected an eagerness for learning, such as "It's about time teachers turned their attention to people who can't read." They also indicated they appreciated professional attention in the "reading problem," stating "not everyone is able to read." Members said, "The pictures help you to understand the words" and expressed their appreciation for the "pictures."

The instructor's oral reading pace proved to be too rapid for some members. A very slow pace is suggested for all limited resource adult audiences, perhaps due to the difficulty of scientific or technical terms (Fredrickson *et al.*, 1995; Hohn, 1998). The collaborating agency staff was both cooperative and knowledgeable, and confirmed the

difficulty in locating groups of adult semi-functional readers since participation in one-on-one or self-paced individualized programs is more common.

As expected, the target audience was not familiar with a research model and members wanted to discuss their personal beliefs and practices about food safety. It was challenging to maintain the focus on evaluating the GES instrument. They had opinions about what was, and was not, acceptable to them. A slower pace for the oral reading was repeatedly requested. They informally elected spokespersons for the group to express their ideas and they encouraged the more vocal members to "speak up!".

Target Audience Focus Group: Functional Readers

Objective 3 was to establish the content validity of the instructional program evaluation instrument for use with adult participants who were functional readers. Adult functional readers were included in content validity analysis to evaluate the potential for the GES to be perceived as demeaning to literate adults. In addition, they were asked to identify items or issues that might be "awkward or uncomfortable" for adults with functional reading skills. The average adult reading level in the United States is at the eighth-to ninth grade level or between NALS levels 2 and 3 in functional competency measures (C. C. Doak *et al.*, 1996). Members of the functional reader group reflected the composition of the "typical" FNP adult audience with literacy skill levels unknown to the instructor. Diverse literacy competency levels were expected since one of five adults reads at the fifth grade level and below or about NALS level 1 in functional competency terms (C. C. Doak *et al.*, 1996; National Work Group on Literacy and Health, 1998).

A rural medical clinic in Pointe Coupee Parish was selected as the study site for the functional reader group. The FG was conducted during a window-of-opportunity preceding scheduled medical appointments (Nurss *et al.*, 1997). The FCS agent had conducted FNP nutrition lessons under similar circumstances at this clinic.

Results for Target Audience Focus Group: Functional Readers

Ten members participated in the functional reader FG, however, information from two members were omitted because their reported age was less than 16 years. The eight remaining functional readers, all female (100%), reported ages ranging from 16 to 41 years, with a mean of 25.25 years $\pm$ 9.29 (SD). The reported educational level was: two participants (25%) completed school through the eleventh grade, one (12%) through the twelfth grade, and five (63%) had achieved a Graduate Equivalence Diploma (GED). All members (100%) indicated they were able to read a newspaper. The data supported the assumption that the reading ability of the group was higher than that of the adult semi-functional reading FG members. Several types of economic assistance were reported: one individual (10%) received commodities; one (10%) participated in food stamps; one (10%) received social security; one (10%) received WIC; and none reported TANF, Child Nutrition, or Head Start.

Full results on GES study can be found in Appendix Q. Themes for the functional reader FG were identified. These included comments and suggestions similar to the adult semi-functional reader group with an added comment. The functional reader group indicated that the oral reading of the text and the associated graphic illustrations were not demeaning to the readers but, rather, facilitated their understanding of the written statement by making it easier to respond to the questions.

Focus Group Analysis and Recommendations

Several systematic steps were employed to facilitate analysis of the FG as suggested by Krueger (1998c). First, a series of eight FG questions were developed to encourage the mining of a maximum amount of information from the discussions (Appendix O). Then, a summary question, "Is there anything else you would like to say about the GES evaluation tool?" was asked of each participant at the conclusion of the group. During the FGs, two audio voice recorders and assistant researcher(s) captured the dialog and dynamics of discussions. At the close of the discussion, the moderator provided the group an overview of the comments and suggestions made by the members to verify broad themes explored in the session. A debriefing was conducted with the assistant researcher(s) and important themes were recorded that had surfaced during the discussion. The tapes were transcribed within two days. Appendix J presents recommendations from the FGs.

Themes for both the adult semi-functional and functional reader FGs were identified. These included more white space in the instrument design, providing a larger space for participants to write their name, changes in the food safety graphic illustrations for ease of comprehension, and general positive comments about the GES. Unanticipated findings were that the adult semi-functional readers expressed a willingness to be exposed to complex words in the text and a suggestion for specific images that would enhance their interest in this lesson.

The FGs determined the GES food safety instrument to be appropriate for them and not awkward to use (Gaston & Daniels, 1988). The FGs revealed that the graphic illustrations made it easier for members to understand the text. From this study, it was

concluded that the GES might meet the communication needs of the adult semi-functional readers in the audience. The GES food safety instrument was easy and economical to produce.

Group Evaluation System Instrument Modifications

The data obtained from the panel of experts and the FGs were evaluated to determine the content validity of the GES instrument. The text, graphic illustrations, and instrument design of the GES food safety evaluation items had a varying degree of content validity. Qualitative data are provided from the comments and suggestions of both the expert panel and the FGs, quantitative data from the GES Item Rating Scale, and three reading level measurements (Appendix J) of the food safety instrument (Baseline and GES Instrument Versions 1 and 2). The weaker items were addressed and modified based on the recommendations of the validity groups, as follows:

- adjustments to graphic design
- modifications to the directions
- changes to text
- adjustments to associated graphic illustrations
- modifications to responses, symbols, and formatting

Changes made to the written and graphic illustration aspects of GES are summarized in Appendix J. The GES was assumed to be valid when used with adult limited resource audiences with diverse literacy skills.

Instrument Questions and Response Choices

The overall format of the GES Instrument Version 2 remained similar to Version 1, except for the following changes: "Undecided," with a corresponding

question mark symbol, was eliminated as one of the four response choices. The text box then was omitted from the three remaining responses and symbols, adding additional white space.

Cover Sheet

The GES food safety instrument directions remained unchanged. A more descriptive title was given to the instrument, incorporating the food safety topic and writing out the whole words for LSUAC. The sample item responses on the cover page were also reduced from four to three in number, consistent with the response modifications previously indicated.

Graphic Illustrations

Both the expert panel and the FG members recommended simpler line images (AMC Cancer Research Center, 1994; Gaston & Daniels, 1988; Michielutte, *et al.*, 1992). In the final GES Instrument Version 2, graphic illustrations for items number 4 and 5 were modeled after images from the UMES Pocket Tool (Coleman *et al.*, 2000) and were used with permission from the artist (Appendix R). Original graphic artwork for items 8, 9, and 10 were produced by Shear Graphix and Metairie Printing in New Orleans, LA. The remaining five GES images (items 1, 2, 3, 6, and 7) were images modified from the existing LSUAC food safety lesson with original artwork created by Elma Sue McCallum, FNP graphic artist.

Visual Modifications

Visual modifications of the instrument included more white space being added between statements, allowing adequate room to circle the desired response. To provide a color coding system, the GES instrument was printed on white paper and the

interview instrument on yellow paper. This allowed color identification of the two data sets and reduced the threat of a test error of measurement (Ary *et al.*, 1996). For instance, by seeing the color of the instruments during the group administered test, the instructor was able to promptly intervene if the incorrect test version (color) was being used.

Two identical 11 x 17 inch flip charts (AMC Cancer Research Center, 1994) with enlarged copies of the 10 GES graphic illustrations were developed for display during the group administrated test (Appendix C). One graphic illustration was printed per sheet of white paper, resulting in 10 pages of graphic illustrations in each flip chart. These graphic illustrations were enlargements of the GES graphic illustrations.

Phase III: Estimated Reliability

A convenience sample of FNP adult participants was used to pretest the GES food safety instrument, to accomplish objective 3. The food safety lesson was conducted, the GES instrument was group administered, and personal interviews were conducted. Objective 4 served to estimate the reliability of the GES instrument by determining the level of agreement between the item responses from the group administered GES instrument and the personal interview. The percentage agreement between the 10 item responses was calculated as an estimate of the reliability of the instrument (Ary *et al.*, 1996).

Participants

Target Population

The target population in this study was Louisiana adult limited resource residents who were eligible for food stamps and those who actually participated in the

Food Stamp Program (FSP). The report, "Facts About Welfare and Food Stamps in Louisiana" indicates that in 1998, the FSP had 469,904 participants in Louisiana, of whom 47% were adults of age 18 and over (Louisiana Department of Social Services Office of Family Support, 2000a). The accessible population is the portion of the target population to which the researcher has access (Ary *et al.*, 1996). For the FNP Fiscal Year 2000, a large group over 161,131 face-to-face contacts by LSUAC FCS Agents and FNP paraprofessionals was generated for FNP audiences. Of this number, approximately 64% or 103,124 were estimated to be adult contacts (LSUAC CES, 2000). The number reported by the LSUAC for adult contacts included an estimate of participants who attended FNP lessons, classes, and other instructor/audience educational settings. Many individuals attended a series of lessons and these contacts were known to be "repeat message" exposures for the same individual. Subjects were selected from this accessible LSUAC adult FNP audience.

Sample Selection Criteria

The study used non-random procedures to select members of a convenience sample (Ary *et al.*, 1996) from the LSUAC FNP audience. Selection of the parishes depended on the convenience and availability of pre formed existing community groups and accessibility of adult target individuals. Randomization is an important control for external validity because it permits findings to be generalized to other populations or groups (Ary *et al.*, 1996). To reduce the external validity threat of using a pre formed group sample, descriptive characteristics of the accessible population sample and target population were provided. In addition, the research setting was as natural to the

environment of the subjects as possible with all study sessions conducted in community education facilities familiar to the sample.

Collaborating agencies provided the meeting facilities. Results from this study indicated that FCS agents observed semi-functional reading adults frequently unseen in their Extension programming audiences. This study increased the awareness of FCS agent and program managers concerning literacy issues with written nutrition education program evaluations in LSUAC adult audiences. This finding supports the implication that some adults are unwilling to disclose a low literacy problem to health educators (Baker *et al.*, 1996).

The sample was obtained through assistance from LSUAC FNP parish contacts and agencies. About 100 volunteers were recruited from the target audience. Subjects were limited to adult individuals participating in FNP classes with group size parameters of 7 to 30 students per class. This class size range reflected the typical size of FNP groups. For the purpose of this study, adults were individuals who were 16 years of age or older and outside of the K-12 formal education system.

The objectives of this study focused on evaluation of limited resource adults with English as their native language. Audiences were not selected when English was known to be a second language for a significant number of individuals in the group. The staff person from each collaborating community agency was contacted regarding the native language status of the group.

Subjects were recruited from four parishes that were situated within a three hour driving distance of the LSUAC state office in Baton Rouge, LA. Community groups were recruited from a senior center, housing developments, remedial community

college classes, a preschool staff, and a literacy program. The participants were familiar with the physical locations of the sites, which enhanced the ease of the participants locating the facility and added toward their comfort with the research environment (Merriam & Cunningham, 1989).

Materials

To collect data, the following materials were required: the food safety lesson and teaching aids, the GES instrument (Version 2), the GES Flip Chart graphic illustrations, the Personal Interview instrument, the Group Demographics Profile, Subject Consent Forms, subject and agency honorariums, and pencils and writing boards.

Participant Acknowledgment

Subjects received modest honorariums for their participation in the study similar to those provided the members of the FGs. The collaborating agency staff received the same gift of appreciation for assisting with convening the group of subjects.

Nutrition Education Lesson on Food Safety

The food safety nutrition lesson was presented to the subjects before the administration of the GES instrument and personal interview. The teaching materials included: an 11 x 17 inch food safety flip chart, two 23 x 34 inch laminated color posters exhibited on a bi panel hinged table top display board, a lesson plan, a brochure, a printed fact sheet, the Fight BAC!® Bacteria puppet, a refrigerator thermometer, a meat thermometer, a small sample bottle of household bleach product, and a teaspoon size plastic measuring spoon.

Minor lesson modifications were based on the principles of adult education (Merriam & Cunningham, 1989). Teaching methods and materials were tailored for the size and composition of the audience. For example, for large groups, the instructor may have walked around the classroom displaying the flip chart or used both charts, placed in strategic positions. The lesson content was static for all study groups. The food safety lesson was conducted for a minimum duration of 20 minutes. Questions were addressed before, during, and after the lesson. No subject matter questions were allowed between the group administered evaluations and the personal interviews.

Program Evaluation Materials: Group Evaluation System and Personal Interview Instruments

The GES instrument was printed on white paper and the Personal Interview Instrument on yellow, allowing for easy identification of the two data sets. Two identical 11 x 17 inch self-standing flip charts containing reproductions of the 10 GES food safety black and white graphic illustrations were also available. Sufficient quantities of sharpened pencils and sturdy boards, *i.e.*, clipboards or firm cardboard, were made available for subjects to use when signing the consent form and when marking their responses on the GES instrument if desks or tables were not available.

Research documents.

A group demographic profile, a parish profile, and a consent form were prepared for the study. A one page Human Subject Consent Form, patterned after the recommendations from the LSU Research Human Subjects Board, was prepared and completed by each participant (Appendix L). The consent was used for study documentation.

Concerns exist among researchers that some limited resource adults might be reluctant to respond truthfully to personal questions regarding their participation in public assistance programs and/or their limited reading skills (Baker *et al.*, 1996; Davis *et al.*, 1998; Parikh *et al.*, 1996). Asking sensitive questions could also potentiate avoidance of participation in the study or may even create spurious data (Wiersma & Jurs, 1990). Indirect data collection avoided sensitive questions that could be perceived as intrusive or intimidating (Baker *et al.*, 1996). Thus, an indirect method was chosen to collect sensitive participant demographic data. The study participants were not the source of the demographic data. The agency staff, considered knowledgeable of general characteristics regarding the study group as a whole, were asked to estimate the participant's characteristics.

A form for a collaborating agency to estimate participant demographics was developed to collect information on estimated personal, social, economic, and educational characteristics judged by the collaborating agency staff for the study group local to their community site. The form was specifically designed to capture an estimation of the group's age range, ethnicity, educational level, employment status, reading ability and level of participation in public assistance (Appendix T). This descriptive data is reported with the study results from the field test. The following characteristics were included on the group profile.

1. Number of participants
2. Gender ratio - Estimated percentage of male and female
3. Age range of participants - Estimated percentage of persons 16-19, 20-29, 30-45, 46-59, 60+ years old (Louisiana Department of Social Services, 2000b)

4. Ethnicity - Estimated percentage of black, white, Hispanic, Asian, Native Indian, and other
5. Estimated percentage of known adult semi-functional readers in the group. This group characteristic was indicated as the percentage of the group who were able to: a) read a newspaper well, b) read most words in a newspaper, c) read just a little of a newspaper, d) hardly read a newspaper. Adult semi-functional reading adults, reading at a level 1 (or below the fifth grade level), do not possess the literacy competency to read a newspaper (Doak *et al.*, 1996). These adults may be able to read a few words in the newspaper and have very basic skills (National Institute for Literacy, 1998).
6. Occupations were estimated in percentages of participants who were home by choice, retired, worked full-time, worked part-time, unemployed, or disabled.
7. Educational level - Estimated percentage of participants who completed some elementary, some junior high, some high school, were high school graduates or had received a GED, had job training, some college, have a college degree, or the status was unknown.
8. Public assistance - Estimated percentages of participants or their children receiving Food Stamps; TANF; Social Security; Commodities; WIC; Head Start; Child Nutrition, Disability, Supplemental Security Income (SSI); or Veteran Benefits.

A Parish Profile Form was created to collect the following characteristics for parishes participating in the data collection (Appendix U).

1. Number of Food Stamp or cash assistance recipients in study site parish
2. Estimated rates of poverty for study site parish

3. Estimated adult semi-functional readers for parish (below reading level 1)
4. Estimated population size -- rural or urban
5. Major economic influences for parish - forestry, oil industry, hospitality industry, and other economic aspects.

Procedures.

Interviewers were trained prior to the data collection by reviewing the GES instrument and their research responsibilities and by conducting a practice evaluation interview to foster consistent measurement. The process of teaching the nutrition education lesson, administering the GES instrument, and conducting the personal interviews took approximately 90 minutes. The group meeting room was prepared for the lesson by a display of the food safety posters (on the hinged exhibit boards) along with the Fight BAC!® Bacteria puppet on a tabletop in the front of the class. The teaching aids (the refrigerator thermometer, oven thermometer, bleach product container, and measuring spoon) were also arranged on the top of the demonstration table in the foreground of the posters (Appendix C). Lesson packets (one for each study participant) contained a pencil, two copies of the study consent form, the GES and the Personal Interview instruments, and a food safety pamphlet. All packets were prepared for distribution at the onset of the lesson. Participant honorariums and the agency gift(s) were also prepared for presentation during the class.

A female instructor, a Registered Dietitian, and a nutrition Extension Associate at the LSUAC FCS state office, conducted the food safety presentations for the study. As an instructor's enthusiasm is known to affect outcome, the same teacher was used throughout the session to control the threat of extraneous variables affecting internal

validity (Ary *et al.*, 1996). The agency staff member in attendance was given the Participant Demographic Profile with verbal instructions for its completed return by the end of the session. When possible, the instructor wrote her name in large, print letters on a board located toward the front of the classroom. Introductions of the instructor and trained research assistants were expressed and an explanation of the study was given in simple terms.

At the beginning of the study session, the target audience was asked to participate in the study and all agreed to participate. Study materials were distributed to the group. Following an oral reading of the subject consent to facilitate comprehension, volunteer participants signed duplicate copies of the LSU Human Study Consent Form. Participants kept one copy of the signed consent for their records and the research team collected the second copy of the signed consent as a permanent record.

Participants were then asked to complete the white GES and the yellow Personal Interview cover sheets by writing in their name, the date, and the location of the meeting in the space provided. Assistance with writing or reading was provided when requested. The date and name of the class location was written on a board in front of the class. Instructions were read aloud, describing procedures for completing the GES instrument. As listed on the cover sheet, the sample GES items (one nutrition knowledge item and one behavior change item) and the three choices for response were also read aloud. Corresponding response symbols were verbally identified.

Participants were instructed to use only the cover page of the instrument and not to investigate the remainder of the study materials until so instructed. Participants were asked to locate the food safety pamphlet in the stack of materials and to bring it to the

top, making sure the side of the pamphlet with the cooking temperature chart was visible. By putting this pamphlet on top of the materials, the GES and the Personal Interview Instruments were not in view during the food safety lesson.

Before the lesson began, honorariums were presented to participants, regardless of their participation in the study. A gift was also presented to the agency staff members who had facilitated the group. Following an overview of the lesson and the exit survey evaluation process, a question and answer period took place.

Administering the Group Evaluation System and Personal Interview Instruments

The GES and the interview data were collected immediately following the lesson, within approximately 10 minutes, between the administrations of the two tests. Study participants were group administered the food safety GES instrument. The instructor displayed a large 11 x 17 inch graphic illustration on a chart that matched a duplicate 1.5 by 2 inch graphic illustration on the GES instrument. Participants were directed to inspect the large GES graphic illustration that was being displayed on the flip chart. Then, they were asked to "find the same picture on their own paper." The participants were informed that the graphic illustration on the display chart identified the current evaluation question.

When the instructor determined that the participants had located the matching graphic illustration on their GES instruments, the instructor then read aloud the corresponding evaluation item along with its number, the response choices, and mentioned the symbols. The food safety evaluation items were numbered to provide logical sequence to the procedure, as suggested by Gaston and Daniels (1988). The participants were asked to follow along while the instructor read aloud the three item

responses ("Yes," "No," "Already knew it," or "Yes," "No," "Already do it") and verbally described the three associated symbols ("✓" for "Yes," "X" for "No," or "star" for "Already knew/do it"). Participants were instructed to circle their desired response to the question being read aloud by the instructor. The participants self-selected the desired multiple choice response with related graphic illustrations, providing an interactive game like atmosphere (Coleman *et al.*, 2000; Freimuth & Mettger, 1990; Macario *et al.*, 1998). The GES was rapidly administered.

The completed GES instruments, with marked responses, were collected from the subjects. The completed instruments were then removed from the view of the class for control purposes. This was done to reduce a possible internal threat to validity from any pupil error with the second (repeated) measure of program impact, the personal interview (Ary *et al.*, 1996). Participants were unable to refer to their responses on the group administered instrument as a means of duplicating them in the interview. Consistent with testing the GES's reliability, questions from participants were not permitted during the interval of time between the group administration of the GES and the personal interview.

The same meeting room used for delivery of the food safety lesson and for administering the GES instrument was used to conduct the personal interviews. One at a time, participants were singled from the study group and brief introductions were exchanged. The interviewer requested the yellow copy of the Personal Interview Instrument from the participant and checked the cover sheet for completion of the participant's name, the date, and the study site. The interviewer filled out the cover sheet information when information was missing.

With the help of the trained interviewers, the personal interviews were conducted. The 10 statements read during the personal interview were identical to the statements on the GES instrument. Interviewers read aloud the 10 evaluation items to each participant along with the three potential responses and documented the subject's answer to an item during the interview by circling the corresponding response on the Personal Interview Instrument. The interview instruments were collected and cataloged, then questions were addressed by the instructor and the agency staff person. Extension agents who collaborated in the data collection process expressed an interest in the GES for additional nutrition education topics and retained copies of the instrument.

Immediately following the group administered GES instrument, study participants were personally interviewed on the identical 10 GES evaluation statements. Administering the GES was quick and convenient. During the interview, participants recalled the graphic illustrations to the interviewer as a way of remembering the question and relating to the oral statements. The food-related graphic illustration provided a "cued recall" for the food safety evaluation statements (Kefalides, 1999). According to Houts *et al.* (1998) and Kefalides (1999), simple line drawings or "pictographs" added to text, can improve low literate individual's recall rates from 15% to 85%.

Phase IV: Data Analysis

Statistical analyses were conducted using the SPSS version 7.5 to fulfill objective 4. Descriptive statistics and frequency measures were calculated for each nutrition education GES and Interview item. The estimated reliability determined the

agreement between item responses for the initial GES instrument and the follow up personal interview.

Descriptive Data

Descriptive data allowed observations to be organized and described (Ary *et al.*, 1996). Second, they enabled informed judgments to be made about the similarities and differences in the sample and the target population. LSUAC FCS Extension agents were subject recruitment liaisons to community agencies.

Research Setting

One of the FCS agents was not a reliable informant about the characteristics of the target audience. Data were collected from six groups and one group with 22 subjects was eliminated as it was not part of the target audience. For this group, minimum wage was not indicative of a limited income family. The adults in the class received private school wages that were entry level and most staff members were college graduates working by choice and not out of necessity, and few, if any, could be considered the working poor.

Parish Profiles

In examining the profiles of the three remaining parishes (the fourth study parish, St.Tammany having been excluded) participating in this study, low literacy estimates ranged from 23% to 39% of the adult population, above the state average of 28% at NALS Level 1 (National Institute for Literacy, 1998). Poverty rates were estimated between 16.0% and 27.9% of all individuals, as compared to the Louisiana state poverty rate of 18.4% (U.S. Bureau of the Census, 1998). Results are presented in Appendix Q.

Sample

Collectively, 10 classes were conducted in the parishes of Orleans, St. James, St. Tammany, and East Baton Rouge. The resulting 120 subjects made up the potential data set. The LSUAC FCS agent identified potential limited resource study audiences. The St.Tammany preschool staff was paid entry level, near minimum wages. The majority of the staff worked to supplement their family's middle income level and, because they could not be classified as resource limited, they were removed from the sample.

From the other study groups, two other cases were also omitted from analysis. One case had a consent form missing and the other lacked data from the Personal Interview. The study sample size was finally reduced to 96 for data analysis but this still exceeded the minimum recommended sample of 50 adults for both tests, although the literature indicated that a random sample was preferred (Wiersma & Jurs, 1990).

The majority of the sample came from the college remedial students, for a combined representation of 64 individuals (67%). The Senior Center and the Public Housing sites had 12 individuals each (12.50%) and the Literacy class was the smallest group, with 8 individuals (8.33%). The college remedial students were judged to have low literacy skills and were tested as enrollment criteria in the class. A community college is not a typical FNP audience venue. This pool of subjects was included in the study because of the large concentration of identified low literacy adults available for testing the GES.

Agency staff estimated this group consisted of about 22.72 males (23.67%) and 73.12 females (76.17%). The FNP Fiscal Year 2000 participant population was

reported as 36% male and 64% female; however, these estimates included youths, which may inflate the number for the adult male population. Only preexisting groups with 7 to 30 members were considered (Table 4).

Table 4

Subjects by Study Group

Site	Subjects (n)	%
Senior Center	12	12.50%
Public Housing	12	12.50%
College Remedial Students		
Class 1	18	18.75%
Class 2	18	18.75%
Class 3	28	29.17%
Literacy Class	8	8.33%
Total	96	100.00%

Nearly three-quarters of the sample were women (Appendix V), consistent with the gender ratios for poverty and food stamp nutrition education participation (LSUAC CES, 2000). Descriptive data on participant characteristics are reported in Appendix V. Over three-quarters of the subjects (83.33%) were estimated to be of black ethnicity with all Senior Center and Housing Development individuals reported as black. FNP audience is estimated to be 56% black for Fiscal Year 2000. No Hispanic were reported by agency staff, similar to minimal Hispanic population estimates of 1.85% for East Baton Rouge, 4.07% for Orleans, and 0.60 for St. James parish. (Louisiana State Census Data Center, 2000). Appendix V provides details of estimated age range for study

groups. Agencies judged 50% of subjects between the ages of 21 and 40. As expected, 100% of participants at the Senior Center were considered over 60; the youngest groups were drawn from the three college remedial classes.

Appendix V presents details on estimated highest education level for study groups. Concerning the education level, 30% of the sample were estimated to have a GED or beyond and 50%, including college students. These estimates added up to greater than 100% of the sample due to the method the agency staff used to judge the educational categories for the group. This seemed to be an unusually high incidence of GED, high school, or college participation for an adult limited resource audience and was not consistent with the literature for this audience (Council for a Better Louisiana Futures Institute, 1999). With 67% of the sample drawn from a college campus for this study, the high college participation rate is understandable. The argument for these students as the target audience is supported by literacy skill estimates reporting that over 80% of the college remedial groups 1 and 2 were "hardly able to read" a newspaper.

In the college remedial group, about 70% were estimated to be "hardly . . . able to read" a newspaper. In college remedial group 3 and the adult literacy class, over 50% of the subjects were judged to be able to "read just a little" of the newspaper or less. College remedial groups 1, 2, 3, and the literacy class reading estimates by agency representatives clustered in the two lowest rankings of reading ability.

From these results, what appeared to be literate audiences, *i.e.* college students, may not be literate (National Institute for Literacy, 1998). Young adults reluctantly divulge their literacy skills accurately on directly measured demographics, considering

the "survival" and unseen attributes (Gaston & Daniels, 1988), stigma, and shame reported in some illiterate adults (Baker *et al.*, 1996; Davis *et al.*, 2000; Parikh *et al.*, 1996).

Appendix V also presents estimated literacy skill for study groups. Nearly one third (31%) of subjects were estimated to be able to "read just a little" of the newspaper. For the Senior Center, the vast majority of subjects (92%) were estimated to be able to "read a newspaper well." This contradicts studies indicating the high risk the elderly have of suffering poor literacy skills (Kirsch *et al.*, 1993; National Institute for Literacy, 1998). This finding may be a reflection of the urban setting or an overestimation by the collaborating agency.

About 60% of the sample were estimated to work either part time or full time. Another 11.67% were unemployed with the remaining 10.50% were either retired or disabled. Employment status was uncertain for 3% of the sample. The estimated public assistance profile for study groups is provided in Appendix V and highlights estimates of participation rates in selected types of common public assistance. Combining data, agencies estimated 81 individual cases of public assistance for the 96 person sample, noting many individuals in the groups were considered multiple program recipients. Over 25% were estimated to be participating in the FSP, a finding similar to the Louisiana FSP participation reports. Over one third (35%) were estimated to receive Social Security and/or Commodity Food Distributions.

Estimated Reliability

Objective 4 was to estimate the reliability of the instructional program evaluation instrument by determining the level of agreement between the responses

from the group administered format and the personal interview. Categorical responses were compared between the GES and the personal interview items. Frequency data were analyzed for each of the 10 GES items by response category for all groups combined. Calculated percentages for items 1 through 10 are reported in Appendix V.

One study using graphic illustrations with nutrition education was identified. The UMES "Learning Tool," tested with 300 participants in 10 counties for reliability, used three methods. The learning tool was found to be "highly reliable" (Haas *et al.*, 1997). For the learning tool, alpha analysis with reliability coefficients ranged from .618 to .430 and correlation between the pre-post tests ranged from .706 to .504. When the learning tool results were compared between EFNEP and FNP, a strong reliability and validity was measured.

Before the data collection, it was established that in order for the GES instrument to be considered comparable to the personal interview format, it must have a measured agreement of 70% across formats. It was desirable to have as close to 100% agreement between the two test versions as possible (Wiersma & Jurs, 1990); however, the expected magnitude of agreement depends on the variables being measured. According to Wiersma and Jurs , there may be a considerable range of reliability among tests within one area. The 70% degree of agreement was determined by examining the literature and considering the subjective nature of the GES test responses. Very little literature was found to serve as a guide when comparing evaluation instruments which bundled written, orally presented, symbol and pictorial elements. Tests that measure subjective variables, like attitude toward school, tend to have a wide range of reliability (.45-.88 for the Attitude Toward School- Secondary Level). Without available

guidelines and reflecting on the Learning Tool alpha reliability data (.618 - .430) a 70% agreement rate between the GES test and the interview was considered promising for the developmental phase of a new instrument format (Wiersma & Jurs, 1990). The Learning Tool and the GES both address an educational need for low literacy audiences receiving public health information from federally sponsored programs.

Response Agreement between Food Safety Group Evaluation System Instrument and Personal Interview

Calculated percents for items 1 through 10 are reported in Table 5. The highest agreement was item 3, with 91.67% item responses in agreement for 96 valid cases. The lowest agreement was for item 6, with 83.16% item responses agreeing for 95 valid cases. Overall, the 10 items had an agreement rate of 87.22%. This is a moderate-to-high degree of relationship or a high rate of participant response agreement between the two measurement formats.

The range of the food safety nutrition items in agreement was 8.51 percentage points from high to low. Seventy percent of the all items had an agreement rate above 86%. With an 87.22% overall response agreement rate, the mean number of items that did not agree for each subject was approximately 1.3 of the 10 food safety evaluation items.

It was established *a priori* that in order for the GES instrument to be considered comparable to the personal interview format, there must be a measured agreement of 70% across formats. Seventy percent or greater of the items in agreement was considered promising for the developmental phase of a new instrument format (Wiersma & Jurs, 1990). The measurements of the two formats of the test were found relatively consistent.

Table 5

Response Agreement between Food Safety Group Evaluation System Instrument and Personal Interview

Item number	Valid cases	Case agreement	% Agreement
1	96	85	88.54%
2	96	87	90.63%
3	96	88	91.67%
4	95	82	86.32%
5	95	80	84.21%
6	95	79	83.16%
7	96	85	88.54%
8	95	83	87.37%
9	95	84	88.42%
10	96	80	83.33%
Total	955	833	87.22%

Aggregated Positive Response Agreement between Food Safety Group Evaluation System Instrument and Personal Interview

Items agreeing between the responses on GES and interview formats improved when the "Yes" and "Already do (knew) it" were combined (Table 6). Some confusion existed regarding answering of the multi-stemmed questions. Participants wanted to answer both "Yes" and "Already knew it" or "Already do it" for the same question. By combining agreement for positive responses, agreement between the GES group

administered and the personal interview increased from 87.22% to 97.28%, or by 10.06 percentage points.

Table 6

Aggregated Positive Response Agreement between Food Safety Group Evaluation System Instrument and Personal Interview

Item number	Valid cases	Case agreement	% Agreement
1	96	96	100.00%
2	96	96	100.00%
3	96	95	98.96%
4	95	95	100.00%
5	95	95	100.00%
6	95	90	94.73%
7	96	89	92.70%
8	95	90	94.74%
9	95	94	98.95%
10	96	89	92.71%
Total	955	929	97.28%

Note. "Yes" and "Already knew it" or "Already do it" responses were combined.

Improving the Group Evaluation System Estimated Reliability

Objective 5 was to identify and implement revisions to the GES instrument to improve the estimated reliability if the participant response agreement between the group administered format and the personal interview were determined to be less than 70%. Procedures would be reviewed and an expert panel consulted to address

instrument modifications following procedures outlined in objective 4. Data collected for objective 4 indicated the lowest percent agreement was 83.16% for item 6 and the GES instrument had an 87.22% mean agreement response rate with the personal interview. This result met the objective 5 criteria and further revisions of the methodology were not necessary under this standard.

SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS

Summary

The Louisiana State University Agricultural Center (LSUAC) Group Evaluation System (GES) was developed and tested for validity and reliability to evaluate a food safety lesson for adult limited resource audiences with diverse literacy skills. It employs a group administered, 10 item, exit survey instrument using existing LSUAC food safety statements. The test format incorporates associated food related graphic illustrations and response symbols with written questions, read by the instructor. A large flip chart with identical food related graphic illustrations accompanies the GES as instructional support material.

During development, a GES instrument mock-up was reviewed by an expert panel and two intended-audience focus groups, one with functional reading skills and one without. Revisions were made to the GES instrument based on their comments. A GES pretest was then conducted with a convenience sample of 96 adult limited resource individuals with diverse literacy skill. To test the instrument, participants received a brief nutrition lesson on food safety and responded to the group-administered evaluation. A personal interview verifying the preceding structured survey was then conducted. Descriptive statistics and frequency measures were used for quantitative data. The expert panel rated the instrument's validity; there was a mean score of 4.25 on a scale of 1 (poor) to 5 (excellent). Qualitative data were analyzed by sorting transcript material into themes. Common suggestions were: use more white space, simplify illustrations, use common words, and eliminate the "Don't know" response. Response agreement between the group-administered instruments and personal

interviews was 87.22%. Aggregating positive responses increased agreement between tests to 97.28%. The implications are that appropriate pictorials (graphic illustrations), response symbols, and orally presented text, provide a measured degree of validity and reliability for group-administered evaluations with adult limited resource audiences with diverse literacy skills.

Hypothesis

Hypothesis: A group evaluation system (GES) will provide valid and reliable measures of nutrition education program impact in adult limited resource audiences with diverse literacy skills.

An exert panel and two focus groups made up of members of the target audience evaluated the food safety GES for content validity and found the GES met the stated criteria. A pretest was conducted by group administering the GES to a sample of adult limited resource individuals with diverse literacy skills. The results of the GES measurements were verified with personal interviews. Agreement between the responses of the GES and the personal interview was 87.22%, which met the reliability threshold criteria established for the study. The hypothesis that the GES will provide valid and reliable measures of nutrition education program impact in adult limited resource audiences with diverse literacy skills was accepted.

Phase I: Instrument Development

Objective 1. To develop an instrument for evaluating the effectiveness of a Cooperative Extension nutrition education instructional program that can be used accurately with adult limited resource program participants with diverse literacy skills.

The concept of the GES as a written-oral, pictorial-symbol, group-administered evaluation system was developed from the University of Michigan Extension Service (UMES) and the LSUAC models. The exit survey model was convenient to measure short term, self-reported, perceived program impact (Merriam & Cunningham, 1989). Using existing models to design evaluation materials enabled the GES to be consistent with the LSUAC FCS system, a practice which is supported in evaluation research (Gaston & Daniels, 1988; Trochim, 1999; U.S. Department of Agriculture, 1995) and is recommended for further development of the GES with other curricula. Nutrition educators should examine and coordinate new evaluation methods with existing models when appropriate to provide consistent measurement of program objectives.

Food-safety evaluation statements adapted from LSUAC for the GES met the instrument development criteria to accommodate a specific curriculum (L. G. Doak *et al.*, 1996; Louisiana State University Agricultural Center Cooperative Extension Service, 1999). Based on the ease of adapting existing materials into the GES format, program managers should consider using existing evaluation instruments and tools as a basis for instrument design.

Ten items made up the length for GES food safety instrument, consistent with the "exit survey" model by LSUAC Family (Louisiana State University Agricultural Center Cooperative Extension Service, 1999). The brief instrument, *i.e.*, exit survey, had a low "respondent burden" as required low-literate individuals (Coleman *et al.*, 2000). The exit survey format was compatible with the items testing self-reported nutrition knowledge and intended adoption of healthy behavior (U.S. Department of Agriculture, 1995). Question order, although an important component of instrument

design (Trochim, 1999), was not changed from the order in the original LSUAC statement document. Further study of question order may be warranted.

Question length was considered in this study (Gaston & Daniels, 1988; Kitao & Kitao, 1999). Multiple components of the existing LSUAC evaluation items were a known limitation of the study and they created longer questions. The multi-component items were ambiguous and contributed to confusion in testing the GES (Trochim, 1999; Wiersma & Jurs, 1990). It is therefore recommended that educators use a single concept per evaluation item to avoid confusion and to decrease the potential for errors.

The word, "will" in the stem of the question has an open ended time-related aspect. It is recommended that a specific period be suggested in the question, *i.e.* a certain behavior would occur "within one month" (Perkin, 1992; Poe, Seeman, McLaughlin, Mehl, & Dietz, 1988; Trochim, 1999). For the purpose of this study, the "Don't know" response was omitted as recommended by the expert panel and focus groups. Two positive response choices were available, "Yes" and "Already knew (or do) it" (Wiersma & Jurs, 1990) which led to response selection confusion. When using existing materials to develop an instrument, reviewing item response choices for clarity may be helpful to improve the test.

Pictorial images (graphic illustrations) were chosen or created for the GES to represent the important message of the written evaluation statements to facilitate comprehension. Graphic illustrations were easily adapted from the UMES Pocket Tool (Michigan State University Extension, 1996) and from the LSUAC FNP food-safety lesson (Alley, Seals, & Wilson, 1998) with the assistance of trained artists. Simple graphic illustrations enhance the educational outreach efforts to the FNP targeted

clientele (AMC Cancer Research Center, 1994; C. C. Doak, *et al.*, 1996; Houts *et al.*, 1998; Keenan, 1999; Diane Linder, personal communication, 2000; Rymes-Barley, 1989). Graphic illustrations may also provide a positive impact on the reading and verbal skills of the participants (Stanovich & Cunningham, 1992). The GES was well received by the FCS agents and the study participants. The full implementation of the food safety GES may potentially be welcomed by these groups.

By reducing large images to a smaller size, *i.e.*, 1.5 x 2-inch, some graphic illustrations lost quality, were difficult to discern, and required graphic adjustments to maintain the interpretive integrity of the image. Line drawings met the GES instrument design needs and were superior to complex images, confirming suggested guidelines for materials for low literate audiences (Gaston & Daniels, 1988; Houts *et al.*, 1998).

Baseline readability of the LSUAC food safety evaluation statements and for the GES Instrument Version 1 and Version 2 was 65.0, 68.2, and 68.0 for the Flesch Reading Ease, and 7.9, 8.4, and 8.3, respectively for the Flesch-Kincaid Grade Level Intervals. The scores from Flesch Reading Ease and the Flesch-Kincaid Grade Level increased from baseline measures. Readability for all measures was near the eighth grade reading skill level. Research indicates the GES is consistent with the mean readability grade level of just above the 11th grade (Johnson & Verma, 1992). The scientific nature of the topics, may explain some of the reading difficulty of the GES (Stephens, 1998; Zion & Aiman, 1989). The measured reading level printed on the document may facilitate decision-making on the appropriateness of the reading level and was suggested by FCS agents and collaborating agencies. Reducing the reading level to grade 3 - 5 may further assist some limited skilled readers. Most adults,

regardless of skill level, prefer easy-to-read material (Kefalides, 1999; Stephens, 1998; University of Utah Hospitals and Clinics Patient Education Clearing House, 1997).

One-inch mirror page margins were used, with spacing as permitted by the length of the evaluation item(AMC Cancer Research Center, 1994; Gaston & Daniels, 1988). As recommended by the literature, the greatest amount of white space was used in designing the GES for adult semi-functional readers. The food-related graphic illustration was placed adjacent to the text to facilitate comprehension; however, potentially the graphic may be remembered longer than the words (Gaston & Daniels, 1988). The written text, related graphic illustrations, responses, and symbols were "boxed in" with a line border in the instrument mock-up (Gaston & Daniels, 1988) which improved the appearance of the instrument and should be considered by future researchers.

The following is a summary of the criteria established for the LSUAC GES during the first phase of the study:

1. It is compatible with the existing Louisiana State University Agricultural Center (LSUAC) Family and Consumer Sciences (FCS) evaluation system data collection methods. The GES uses existing evaluation statements that accompany current FNP lessons, similar categorical responses, and print matter exit survey methods.
2. It is time efficient to administer. The GES maintains the 10 item exit survey brevity, requiring only the addition of an oral reading of written evaluation statements and a showing of the associated food related graphic illustrations.

3. It is economical to produce. The three page GES can be produced on standard office equipment, such as a copier.
4. It is labor saving compared to alternative individual interview evaluation methods.
5. It is easily administered to a wide range of English speaking adult audiences. The GES is a paper and pencil format instrument that, with the addition of food-related graphic illustrations and oral reading, is compatible with the diverse literacy skills of adult limited resource audiences.
6. It is easy to score. The GES has a single response, close-ended, item format permitting frequency calculations of each response category.
7. It is easy to analyze. GES data is compatible with the LSUAC statewide electronic web based FCS evaluation system.
8. It has the potential to provide inclusive data for decision-makers. The GES expands nutrition education program impact data to include the under recognized semi-functional reading adult.
9. It accommodates a variety of curriculum topics. The GES has the potential to be adapted and tested for additional FCS lessons and, specifically, for FNP curriculum materials such as "Go For a Healthy Pregnancy."
10. It has the potential to provide audience specific data for program improvement. The GES data can be manipulated by the existing FCS evaluation system that can query data by selecting audience segments and examining responses for particular groups like Headstart parents or seniors to determine learning needs.

11. It is a standardized format. The GES is printed single sided on three sheets of letter size paper.

Phase II: Validity and Instrument Refinement

Objective 2. To establish the content validity of the instructional program evaluation instrument for use with adult participants who were semi-functional readers.

Objective 3. To establish the content validity of the instructional program evaluation instrument for use with adult participants who were functional readers.

A mean score of 4.25 was calculated from the expert panel validity ratings for the GES. Items were scored on a 5-point integer scale, with ratings from 1 (poor) to 5 (excellent). They also reported the GES items met the criteria for content validity through written suggestions which included 1) improving graphics to reflect message more clearly, 2) encouraging the importance of the graphics for all participants, 3) offering an alternative term for "foodborne illness," and 4) to shorten the sentences by deleting the multiple question stems. Final modifications to instruments are ideally made by incorporating additional assessments from the intended population.

A focus group was conducted with adult semi-functional reading individuals to collect their impressions and recommendations for the revisions of the GES mock-up instrument (Hartman, McCarthy, Park, Schuster, & Kushi, 1994; Kitao & Kitao, 1999; Krueger, 1994; Stephens, 1998). Locating pre-existing groups of adult semi-functional readers was more difficult than anticipated, possibly because individual literacy instruction is the norm.

Items used as honorariums were visual reinforcements of the food-safety message. This practice was well received by the collaborating agency and the participants, and is recommended to enhance learning through visual models. The FG was guided by ten structured questions on instrument-development (Krueger, 1998). The findings of the FG contributed to modifications to improve the food-related graphic illustrations and content statements for semi-functional reading adults.

Participant remarks reflected an eagerness for learning, such as "It's about time teachers turned attention to people who can't read." This may indicate the GES would be received in a positive manner with future lessons. The instructor's oral reading pace was reported as being too fast for some members of this focus group. A very slow pace is suggested for all adult limited resource audiences, due to the difficulty of scientific or technical terms (Fredrickson *et al.*, 1995; Hohn, 1998).

Data from the focus groups were analyzed for general themes and concepts, and considered for modifications. The adult semi-functional reader focus group established the GES food safety instrument to be appropriate for them, and not awkward to use (Gaston & Daniels, 1988). They revealed that the graphic illustrations made it easier for members to understand the text. From this study, it was concluded that the GES meets the communication needs of the semi-functional readers in the audience. Questions should be simplified, replacing multi-barreled stems with single concept questions, as suggested by the focus group.

A second focus group, one with functional reading individuals, was also conducted. All members indicated they were able to read a newspaper, which served as an approximation of self-reported reading skills. The FCS agent and collaborating

agency staff were helpful in identifying the reading ability of this focus group. Themes for the functional reader FG were identified and included comments and suggestions similar to the semi-functional reader focus group with the addition of the following items. The functional reader group indicated that the oral reading of the text and the associated graphic illustrations were not demeaning to them, but rather facilitated their understanding of the written statements by making it easier to respond to the questions. The text, graphic illustrations, and instrument design of the GES food safety evaluation items had a varying degree of content validity. The weaker items were addressed and modified. The GES was assumed valid with adult limited resource audiences of diverse literacy skills.

Phase III: Estimated Reliability

The reliability of the GES instrument was estimated by conducting a food safety lesson with a 96-person convenience sample of the target audience. The GES instrument was group-administered with written and spoken language, pictorials, and symbols. Following the GES test administration, participants were interviewed with an identical survey to verify results. The responses to the GES and the interview were then compared.

Objective 4. To estimate the reliability of the instructional program evaluation instrument by determining the level of agreement between the participant responses from the group-administered format and the personal interview.

The target population was the Louisiana FNP adult audience, both actual and potential food stamp participants. LSUAC FCS extension agents were subject

recruitment liaisons to community agencies, although one of the FCS agents was not a reliable informant about the characteristics of the target audience. Although data were collected from six groups, one group, with 22 subjects, was eliminated, as the adults did not fit the target audience profile. Most group members were college graduates working by choice, and not out of necessity, and few, if any could be considered the working poor. Future researchers are cautioned to closely monitor accord between the intended audience for the test and the pretest group during test development.

During this study, many time consuming questions and comments surfaced about the research process and subject confidentiality. Adequate time is recommended to read consent forms to semi-functional readers. A 20-minute FNP food safety nutrition lesson was presented using teaching materials that included a flip chart which facilitated identification of the graphic illustrations. Following the lesson, study participants were group-administered the GES instrument. The instructor displayed a large graphic illustration on the flip-chart that matched a corresponding smaller one on the GES instrument. A second test moderator, perhaps the collaborating agency staff, may be helpful to display the flip-chart illustrations while the instructor reads the text statements, especially for larger classes.

The food safety evaluation items were numbered and provided logical sequence to the procedure (Gaston & Daniels, 1988). This benefited some individuals who called out the number of the item during the test administration. The participants self-selected the desired multiple-choice responses with related graphic illustrations, providing an interactive game-like atmosphere (Coleman *et al.*, 2000; Freimuth & Mettger, 1990; Macario *et al.*, 1998). This pleasant atmosphere was most evident when participants

expressed intermittent comments like "Got it!" Immediately following the group administered GES instrument, study participants were personally interviewed on the identical GES evaluation statements. To conduct the interviews in a timely manner, several trained assistants were required for the larger groups: 28 participants with 7 assistants allowed each assistant to conduct 4 individual interviews in a class.

Administering the GES was quick and convenient. For the largest group (28 participants), the GES was administered to all participants within 15 minutes. During the interview, although not a part of the study, participants frequently recalled the food-related graphic illustrations to the interviewer during the oral statements. The graphic illustration may have provided a "stimulus recall" for the statements (Kefalides, 1999).

Future researchers are recommended to conduct interviews in a more private setting if available. This was not feasible with the large classroom setting and multiple trained interviewers. A room divider or a privacy screen may offer greater confidentiality for the subjects, and prevent unnecessary disruptions from the class.

Phase IV: Data Analysis

Descriptive data were collected on the research setting, the subjects, and the study parish sites. Descriptive statistics were performed to estimate the reliability by calculating the agreement between responses for the GES instrument and personal interview. The GES was determined to be a reliable measurement tool when compared to personal interview responses. The reliability of the instrument was reflected by a mean agreement rate of 87.22% between tests.

An approximate demographic profile, provided by the collaborating agency, included social, economic, employment, literacy skill, and educational characteristics of

the study group. Indirect data collection avoided sensitive questions that could be perceived as intrusive or intimidating (Baker *et al.*, 1996). All potential study participants consented to participate in the study. They may have a relationship with the non-invasive approach of collecting personal demographic data.

A convenience sample of 96 limited resource adult semi-functional and functional readers in three parishes participated in the testing of the food safety GES instrument. With a 96 person sample size, conducting personal interviews with was time consuming and required several trained assistants, as stated previously. This requirement for field-testing was facilitated by the use of dietetic and diet technician student volunteers and is suggested when feasible.

Agency staff estimated the sample consisted of 26 males (27%) and 70 (73%) females. The FNP FY 2000 participant population was 36% male and 64% female; however, these FNP program estimates include youth. The majority of the sample came from the College Remedial Student group, for a combined representation of 64 individuals (67%). The Senior Center and the Public Housing sites had 12 individuals each (12.50%) and the Literacy class was the smallest group with 8 individuals (8.33%). Although the College Remedial students were tested as college entrance enrollment criteria and judged to have low literacy skills by the collaborating agency staff, a community college is not a typical FNP audience venue. This pool of subjects was included in the sample because of the large concentration of identified low-literate adults available in these classes for testing the GES and the difficulty of locating pre-formed low-literacy groups.

Study site parish profiles revealed population data on food stamp participation, poverty rate, population size, reading level, and major economic influences. In examining the profiles of the three parishes participating in the pretest phase of the study, parish literacy estimates ranged from 23% to 39%, above the state average of 28% at the lowest reading level (National Institute for Literacy, 1998). Poverty rates were estimated between 16.0% and 27.9%, as compared to a state poverty rate of 18.4% (U.S. Bureau of the Census, 1998).

Concerning the education level, 87% of the sample were estimated to have at least a GED and 67% had some college education. These estimates added up to greater than 100% of the sample due to the method the agency staff used to judge these educational categories for the group. This seemed to be an unusually high incidence of GED, high school, or college participation for a limited resource adult audience and was not consistent with the literature for the demographic characteristics for this target audience (Council for a Better Louisiana, 1999); however, with 67% of the sample drawn from a college campus, the large representation of college student is understandable. The argument for these students as the target audience is supported by literacy skill estimates, reporting that over 80% of the Remedial College Groups 1 and 2 were "hardly . . . able to read" a newspaper. In College Remedial Group 3 and the adult literacy class, over 94% of the subjects were judged to be able to "read just a little" of the newspaper. From these results, what appeared to be literate audiences, i.e. college students, may not be literate (National Institute for Literacy, 1998). Therefore, when designing evaluation materials for limited skill readers, field-testing is recommended with individuals with comparable reading skills.

Young adults reluctantly divulge their literacy skills accurately on directly measured demographics, considering the "survival" and unseen attributes (Gaston & Daniels, 1988), stigma, and shame reported in some illiterate adults (Baker *et al.*, 1996; Davis, Williams, Branch, & Green, 2000; Parikh *et al.*, 1996). Therefore, an indirect method of collecting group demographic data is recommended for sensitive information when an overall impression is desired and exact precision is not required. The indirect method of demographic data collection proved useful for demographic information on reading skills, public assistance, and education level in this study.

The GES was pretested with adults who had diverse literacy skills. Collaborating agencies were asked about their group's literacy skills. They estimated nearly half (47%) of subjects were "hardly . . . able to read" a newspaper. Results indicated nearly one third (31%) of subjects were estimated to "read just a little" of the newspaper.

By combining data, agencies estimated 81 individual cases of public assistance for the 96-person sample. Many individuals in the groups were considered multiple program recipients. Thirty percent were estimated to be participating in the Food Stamp Program, surpassing 11% of the Louisiana FSP participation.

Objective 4 was to estimate the reliability of the evaluation instrument by determining the level of agreement between the responses from the group-administered format and the personal interview. Frequency measures were calculated, and the GES instrument and the personal interview responses were analyzed. Seventy percent or greater agreement between the items was considered *a priori* for the developmental phase of a new instrument format (Wiersma & Jurs, 1990). The measurements of the

two formats of the test (GES and interview) were relatively consistent. Some responses between the test-retest did not agree, and this was expected. Errors were judged to be within acceptable parameters. The overall percentage of agreement between items was also 87.22%, with the weakest agreement for item number 6 being 83.20% ($\underline{n} = 95$) and the strongest agreement for item 3 with 91.70% agreement ($\underline{n} = 96$). Overall, the 10 items had an agreement rate of 87.22%, indicating subjects matched approximately 8.7 of the 10 items on both tests. The range of the rate-of-agreement for all items was 8.5 percentage points. Seventy percent of the items had an agreement rate above 86.00%. This is a moderate-to-high degree of relationship, or a high rate of participant response agreement between the two measurement formats.

Comments from participants during administration indicated some confusion existed with the responses "Yes," "Already knew it," or "Already do it." For some of the questions, the subjects wanted to answer both "Yes" and "Already knew it" or "Already do it." Because of this conflict in response choices, the positive responses were combined. Item response agreement between GES and interview formats improved when the "Yes" and "Already do it" or "Already knew it" were combined. By combining agreement for positive responses, agreement between the GES group administered and the personal interview increased from 87.22% to 97.28%, an increase of 10.06 percentage points.

In Phase IV, both qualitative and quantitative data were examined and summarized. Measurements were conducted to compare the GES with the interview based on established reliability criteria. Data from the expert panel and two focus groups were analyzed during the study phase that these measurements were conducted.

Objective 5. To identify and implement revisions to the GES instrument to improve the estimated reliability if the participant response agreement between the group-administered format and the personal interview was determined to be less than 70%.

Data collected for Objective 4 indicated the lowest percent agreement was for item 6, 83.16%. The GES instrument had an 87.22% mean agreement response-rate with the personal interview, precluding additional data collection. Future researchers are encouraged to establish a higher level of agreement than 70%, because educators should strive for the highest attainable instrument reliability. As stated previously, the agreement between the GES and the personal interview responses was above 70%. Due to the acceptable performance of the GES in the initial reliability testing, further design changes or modifications were not necessary for this study. The final GES model, already modified from comments drawn from a panel of knowledgeable professionals as well as comments offered by two FGs representing the target audience, was accepted as being sufficiently reliable to meet all test criteria. No post test changes were indicated and none were instituted.

The Group Evaluation System and the Learning Tool

Very little data were found to compare written, orally presented, symbol, and pictorial nutrition education evaluation instruments. One study using graphic illustrations with nutrition education was identified: the UMES "Learning Tool." The GES was developed for the LSUAC extending the written, oral, pictorial, interactive methodologies of the UMES Learning Tool. Common evaluation methodologies for the UMES and the LSUAC systems are 1) interactive for adult semi-functional readers, 2)

designed for Cooperative Extension nutrition education programs, and 3) group administered to limited resource audiences. A comparison of the LSUAC GES and the UMES Learning Tool follows.

The 40 item UMES Learning Tool allows individuals to self-select taking either a written test or a semi-reader/pictorial evaluation (Michigan State University Extension, 1996). The Learning Tool was developed for the entire "Eating Right is Basic" curriculum (3rd ed., ERIB III) used by both the Expanded Food and Nutrition Program (EFNEP) and the Family Nutrition Program (FNP). The Learning Tool constructs consist of food safety, food preparation, budgeting, feeding children, basic nutrition, using food labels, and emergency food situations. As a pre-post test format, it was tested over a 6-month period. While useful to establish a baseline score for a participant, this 40-item instrument was less compatible with a narrowly focused food safety lesson. The LSUAC GES was developed as a 10-item brief exit survey for one specific lesson on food safety within the FNP curriculum. In this study, the validity and estimated reliability of the GES was tested; however, construct change was not measured.

For the Michigan study (1996), an advisory team developed the content of the Learning Tool and established initial face validity of the original 37 behavior statements. Later, 50 participants in three counties tested the instrument. Based on these findings, items were changed, reworded, split, and resulted in 40 items. Following revisions, 250 participants (150 FNP and 100 EFNEP) were used to evaluate the impact of the two programs. For the LSUAC GES, an expert panel of 10 professionals evaluated the content validity using a structured rating scale. Two FNP

target audience focus groups with a total of 18 individuals, also evaluated the instrument for content validity. To establish the GES validity with low literate adults, one of the focus groups was composed of adult semi-functional readers. Following revisions, the GES was field tested with 96 FNP target audience participants, which included adult semi-functional and functional readers. The Learning Tool has a different format, is longer, and was field tested with more individuals than the GES.

The Learning Tool uses cards and pockets. Instructors read statements showing corresponding illustrations. The participants put a small card with the statement into one of six pockets on the tool labeled "never" (0), "hardly ever" (1), "sometimes" (2), "most of the time" (3), "always" (4), and "does not apply" with no number. These are scaled items. The LSUAC GES is a paper and pencil instrument with self-selected responses, and food related graphic illustrations, with an oral reading of the written questions while showing corresponding graphic illustrations. Categorical responses include: "Yes" with symbol "✓," "No" with symbol "✗ ," and "Already knew it" or "Already do it" with symbol "★." Due to the characteristics of the response variable, the Learning Tool and the GES were tested with different statistics for reliability.

The Learning Tool was found to be "highly reliable" (Haas *et al.*, 1997). The alpha analysis with reliability coefficients ranged from .618 to .430 and correlations between the pre-post test ranged from .706 to .504. When the Learning Tool results were compared between EFNEP and FNP, a strong reliability and validity was measured (Haas, Himebauch, & Coleman, 1997). Two strategies were used to test the reliability of the GES: 1) the written, oral, pictorial, symbol instrument allowing participants to self-select response choices immediately followed by 2) a personal

interview conducted by trained assistants. In this study the GES and personal interview responses had an 87.22 % agreement. The Learning Tool results indicate significant improvements occur in food and nutrition behaviors because of the EFNEP and FNP program and that participants are highly satisfied. The authors indicated that the evaluation data helped to better understand and describe the at-risk population and their needs (Haas *et al.*, 1997). The GES results indicate the food safety instrument is valid and reliable when working with adult limited resource groups with diverse literacy skills. The LSUAC GES thereby permits a satisfactory and simultaneous evaluation of divergent groups of adult learners.

Conclusions

The results of this GES model development indicate that:

1. It is possible to group-administer an evaluation for nutrition education programs with adult audiences having diverse literacy skills.
2. Group evaluation methods that target adult semi-functional readers can potentially be valid and reliable for audiences with diverse literacy skills.
3. Future researchers can expand the GES model over a wide range of subject matter to educational delivery strategies intended for adult audiences with semi-functional reading skills.

Recommendations

Based on the results of the study, the following general recommendations were made. Recommendations to researchers are consistent with ideas presented in. Hatry and Kopczynski (1997), "Performance Measurement: Getting Results."

1. Implement the GES Food Safety Evaluation Instrument

Community nutrition educators are encouraged to assume that adult limited resource participants can not read at a functional level. Many adult, limited resource participants have functional reading skills and those individuals with the lowest literacy skills are the population most in need of the nutrition intervention message being delivered. Community nutrition educators are encouraged to provide more inclusive strategies when working with any limited resource audience.

2. Implement the GES Model

The GES model offers two benefits if applied to present LSUAC CES programs. First, an evaluation tool sensitive to the needs of the clientele permits analysis of delivery strategies and can offer improvements to those strategies. Second, the process of administering a GES increases the awareness of CES agents and administrators to the unidentified semi-functional readers in their audience while, at the same time, provides a learning strategy which is accepted by the functional and semi-functional reader alike.

Subtler or more long range benefits also argue in favor of implementing the GES model immediately. Development of more effective teaching strategies, increased respect between the staff and the clientele, increased ease of delivery, lower labor costs, more responsive audiences, and an increased likelihood of having the lesson applied are all possible beneficial consequences of adopting a GES model. While no direct evidence to some of these claims may exist, qualitative responses from the focus groups indicate that further research could substantiate these claims. The GES model is a solid concept upon which to build the tools necessary to meaningfully improve current LSUAC CES nutrition education strategies.

3. Expand GES to Other Family and Consumer Sciences Subjects

Nutrition education GES instruments should be adopted for additional topics and should be fully tested for validity and reliability for those uses. Based on the ease of adapting existing materials into the GES format, program managers should consider using existing evaluation instruments and tools as the basis for instrument design. This study created an opportunity for several disciplines to contribute to the creation of an instrument. Professionals in various areas of literacy, evaluation, Extension, and adult education were involved. Additionally, representatives of the target audience provided very useful qualitative insights which aided the construction of the GES and offered analytical depth to the conclusions. It is recommended that future GES models be developed with close support of knowledgeable professionals as well as a review with representatives of the target audience by using focus groups.

4. Establish Design Criteria for Evaluation Instrument Development

It is recommended that future researchers should establish instrument design criteria during the conceptualization phase to guide the development process. Based on the findings of this study, it is suggested that the GES remain at the approximate current length, 10 items. Visual learning and evaluations, with graphic illustrations, such as lined drawings, should be use a thick lined graphic illustrations in order to provide consistent visual messages.

It is recommended that educators use a single concept (stem) per evaluation item to avoid any confusion, possibly increasing the potential for the responder to make an inaccurate choice. This may be particularly helpful with semi-functional readers. In addition, seven of the nutrition behavior change evaluation statements used the word

"will" in the stem of the question, which implies an open ended period. It is recommended a specific time be suggested in the question, for example, I will use a meat thermometer "within one month" to check for doneness when I bake a chicken (Trochim, 1999).

As the nominal responses for the 10 items proved to have limited analytical potential, additional nominal data are suggested in future investigations to support Cramer's V for a contingency table and to conduct correlation measures between items. Interval measures to support statistics like Cronbach's alpha (the "reliability coefficient") would permit internal consistency to be estimated for the items in the scale. Alpha might be especially helpful in instrument design with use of the report "Alpha if item deleted" option (Trochim, 1999), allowing researchers to identify weaker items for omission or revision. By restructuring the GES responses into an integer scale, a Likert response scale with 1 to 5 bipolar ratings present a measurement on an interval level (Trochim, 1999). These Likert integer formats are not consistent with the existing LSUAC FCS evaluation reporting system and would require system revisions for conformity for use with that system.

5. Broaden Evaluation Scope for Program Accountability to All Semi-Functional Readers with GES

LSUAC should provide managers with effective tools to assure program accountability for those projects which target limited resource adults with semi-functional reading skills. Program impact data gathered from the GES has the potential to guide not only strategic planning, but also a three-to-five year CES plan of work. Performance based funding mandates are relatively recent modifications to CES

program support and require more intensive effort to reach "literacy isolated" individuals. The GES could assist in documenting evidence for results based budget planning, as CES continues to change and adapt to meet the needs of the community.

The GES focused attention on activities of one agency and the impact of those activities on the individuals they serve (O'Neil & Richardson, 1999; Richardson, 1996a; Richardson, 1996b). The results of the evaluation is consistent with the purpose of the 1963 Adult Education Act which mandated that educators address all learning needs of our citizens -- physical, mental, and economic -- and, as emphasized in this study, the literacy competency as well. The GES now has the potential to satisfy the GPRA for agencies accountable for program outcome measures with adult semi-functional readers.

6. Provide Administrative Support for GES Implementation

Administrators, legislators, and USDA are encouraged to provide adequate upper level administrative and visibility support in using the GES as an evaluation method with adult learners whether they are semi-functional or functional readers. Staff personnel need adequate time to perform evaluations like the GES and special training is required for Extension educators to promote ongoing data collection when working with adult limited resource audiences. Evaluation professionals are needed to provide procedures, appropriate research design, data collection, and interpretation.

7. Slowed Rate of Speech for Adult Semi-Functional Readers

Supplemental oral language is also recommended when written evaluation materials are group distributed to semi-functional reading adults. Educators should train with methods using a slow oral language pace when working with semi-functional reading adults. This method permits the target audience to follow the progress of the

evaluation unhindered by a failure to comprehend. The GES was well received by those in the field as many of the FCS agents opted to keep the test module, considering it an improvement over current text-based methods.

The GES has promise as a group evaluation system for nutrition educators. The GES was economical, convenient, efficient, and reliable, as compared to personal interviews. Resulting implications form this study are that pictorials (graphic illustrations) response symbols, and orally presenting text, may enrich the learning experience for adult semi-functional readers when a group administered written evaluation is presented.

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APPENDIX A

EVALUATION INSTRUMENT FOR LOUISIANA STATE UNIVERSITY AGRICULTURAL CENTER FOOD SAFETY LESSON

3. **Home Economics In Programming**

Written formatted Outcome Evaluation

Nutrition, Diet and Health

Program Objective or Goal N1

Louisiana residents will adopt healthy lifestyles and habits to improve health and reduce the incidence of disease including heart disease, diabetes, hypertension, obesity, osteoporosis, cancer, and other conditions.

Program Objective or Goal N2

Women of childbearing age will follow recommendations regarding proper diet, exercise, and lifestyle practices that will result in healthy infants.

Program Objective or Goal N3

Louisiana residents and food handlers to improve food safety by controlling or eliminating foodborne risks.

Program Objective or Goal N4

Clientele will increase their access to a healthy food supply through assistance programs such as WIC and food stamps and developing food buying skills to stretch food dollars and food stamps.

Nutrition, Diet and Health Evaluation Statements

Today I learned...		**Yes**	**No**	**Don't remember**
1	...the importance of completing 30 minutes of moderate exercise most days of the week.	**Yes**	**No**	**Don't remember**
2	to consume no more than 30% of calories from fat and less than 10% (of total calories) from saturated fat.	**Yes**	**No**	**Don't remember**
3	...to choose a diet moderate in sugar.	**Yes**	**No**	**Don't remember**
4	...to consume a diet lower in salt and sodium.	**Yes**	**No**	**Don't remember**
5	...to choose a diet with plenty of fiber from grains, fruits and vegetables.	**Yes**	**No**	**Don't remember**
6	...to consume 2 to 3 servings of low fat dairy products daily.	**Yes**	**No**	**Don't remember**
7	...the importance of receiving early and continuous health care during pregnancy.	**Yes**	**No**	**Don't remember**
8	...the importance of avoiding smoking, alcohol and other drugs.	**Yes**	**No**	**Don't remember**
9	...how foods high in folic acid can help prevent certain birth defects.	**Yes**	**No**	**Don't remember**
10	...what can cause foodborne illness.	**Yes**	**No**	**Don't remember**
11	...how to reduce my chances of getting a foodborne illness.	**Yes**	**No**	**Don't remember**
12	that a food thermometer is the best way to determine whether a food is cooked enough.	**Yes**	**No**	**Don't remember**
13	...about assistance programs that can help me extend my food dollars.	**Yes**	**No**	**Don't remember**
14	..about assistance programs that can help me extend my food dollars.	**Yes**	**No**	**Don't remember**
15	..to use the food ads and the food guide pyramid to plan what my family will eat.	**Yes**	**No**	**Don't remember**
16	...the importance of making a list before shopping for food.	**Yes**	**No**	**Don't remember**
17	...how to use unit pricing to compare prices of different products and different sizes of the	**Yes**	**No**	**Don't remember**
18	...how to read the nutrition label to make healthy choices in the supermarket.	**Yes**	**No**	**Don't remember**

As a result of what I learned, I will.....		Yes	No	*Already doing it*	*Undecided*
1	...start an exercise program.	Yes	No	*Already doing it*	*Undecided*
2	reduce the number of calories I eat from fat to less than 30%.	Yes	No	*Already doing it*	*Undecided*
3	choose a diet moderate in sugar.	Yes	No	*Already doing it*	*Undecided*
4	reduce the amount of salt and sodium in my food.	Yes	No	*Already doing it*	*Undecided*
5	eat more whole grain breads and cereals.	Yes	No	*Already doing it*	*Undecided*
6	consume 2 or more servings of low fat dairy products daily.	Yes	No	*Already doing it*	*Undecided*
7	make regular visits to a doctor for prenatal care.	Yes	No	*Already doing it*	*Undecided*
8	...avoid alcohol, cigarettes and drugs during my pregnancy.	Yes	No	*Already doing it*	*Undecided*
9	...eat foods high in folic acid.	Yes	No	*Already doing it*	*Undecided*
10	wash hands with hot, soapy water before handling food and after using the bathroom, changing diapers and handling pets.	Yes	No	*Already doing it*	*Undecided*
11	wash cutting boards, dishes, utensils and counter tops with hot, soapy water after preparing each food item and before going on to the next.	Yes	No	*Already doing it*	*Undecided*
12	keep raw meat, poultry and seafood separate from other foods (in the grocery cart, in the refrigerator and while preparing).	Yes	No	*Already doing it*	*Undecided*
13	use a food thermometer and temperature chart to determine whether foods (especially meats) are cooked all the way through.	Yes	No	*Already doing it*	*Undecided*
14	...make sure food is not kept in the danger zone (40 degrees F to 140 degrees F) for more than two hours	Yes	No	*Already doing it*	*Undecided*
15	defrost food only in the refrigerator, under cold water or in the microwave.	Yes	No	*Already doing it*	*Undecided*
16	cool large batches of food quickly by putting the post in ice water and stirring, and then dividing into small , shallow containers and refrigerating or freezing.	Yes	No	*Already doing it*	*Undecided*
17	cool large batches of food quickly by putting the post in ice water and stirring, and then dividing into small , shallow containers and refrigerating or freezing.	Yes	No	*Already doing it*	*Undecided*
18	...use the food ads and the food guide pyramid to plan what my family will eat.	Yes	No	*Already doing it*	*Undecided*
19	...make a list before shopping for food.	Yes	No	*Already doing it*	*Undecided*
20	...use unit pricing to help me compare prices of different products and different sizes of the same product.	Yes	No	*Already doing it*	*Undecided*
21	...read the nutrition label to make healthy choices.	Yes	No	*Already doing it*	*Undecided*

APPENDIX B

LESSON PLAN FOR LOUISIANA STATE UNIVERSITY AGRICULTURAL CENTER FOOD SAFETY LESSON

Louisiana's Future: Families and Children

Fight BAC – Make food safety a habit!

FNP

Materials:

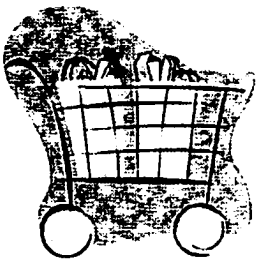
- Flip chart or transparencies
- Fight BAC Exhibit
- "Don't Get Bugged by Foodborne Illness" game
- Black light handwashing kit (optional)
- Thermometer, Styrofoam cup, ice water, boiling water (optional)
- Fight BAC brochures
- Fight BAC magnets
- Transparency Masters for "Can your kitchen pass the food safety test?" & answer/discussion guide (optional)

Other resources:

Safe Food Handler Program Guide
Food Safety Fact Sheets

As a result of this lesson Families will learn:

how to practice basic safe food-handling techniques in their homes.



Families will do:

apply safe food-handling techniques at each step in home food preparation (from shopping to serving).

Evaluation:

1. To determine level of understanding, ask participants at the end of the session to discuss ways they can practice safe food handling at each step in home food preparation: shopping, storing (fresh and leftover), thawing, preparing, cooking, holding, chilling cooked foods, serving and reheating.
2. Distribute the evaluation form for this lesson after the above discussion has taken place. Encourage participants to pledge to follow these practices for at least a month, so they become a habit. At 6 months, participants will be questioned as to which habits they continue to follow.

Background Information:

This lesson is based on two resources that both cover the same basic food-handling techniques. The first is the Fight BAC campaign from the Partnership for Food Safety Education, which emphasizes four simple steps to food safety. Each parish should have Fight BAC brochures as well as a community action kit. Additional materials can be viewed or downloaded from the Partnership's web site at: http://www.fightbac.org

The second resource is from FoodTalk, an electronic publication from the University of Nebraska Cooperative Extension Service in Lancaster County. It is called the "Seven Highly Effective Habits for Home Food Safety." Also from this organization is a game called "Don't Get Bugged by Foodborne Illness." The FoodTalk newsletter may be found at: http://ianrwww.unl.edu/ianr/lanco/family/foodtalk.htm

Learning Experiences:

Flipchart or transparency lesson
Black light hand washing activity (optional)
Thermometer calibration (optional)
"Don't Get Bugged by Foodborne Illness" game
"Can your kitchen pass the food safety test?"quiz (optional)

Louisiana State University Agricultural Center

Suggestions for different age groups:

Youth:

-Emphasize hand washing.
-Emphasize things youth may do as chores:
time/temperature abuse (putting up leftovers, clearing the meal from the table) proper cleaning, sanitizing (dishes, cutting boards, counter tops) preventing cross-contamination (food preparation)

-Have them make and color a reminder list for the fridge to share the important points of this lesson with the whole family.

Adult:

-Have parents recall a time when they or their children were ill with vomiting, diarrhea, upset stomach, and think about costs associated with getting sick – money, lost work, suffering. It is worth the time and effort to make food safe.

-Discuss how they will teach their children and other family members these practices.

-Explain to people who see no reason to change current practices:

1. They may have had foodborne illness and not realized it.
2. Germs are always emerging. Techniques that seemed to work before may not be enough for more dangerous pathogens today.
3. The food supply has changed (the food at your table comes from around the world).

Elderly:

-Emphasize refrigerating leftovers and home-delivered meals promptly.

-Emphasize dating and labeling leftovers, identifying store dates on foods and what they mean.

-Suggest a regular fridge clean-out day, and mark calendar so as not to forget.

-Suggest using a thermometer for meats, so as not to rely on vision to determine the color.

-Emphasize that foods do not have to look, smell or taste bad to be harmful.

-Explain to people who see no reason to change current practices that, as people age, their immune systems weaken and stomach acid decreases (stomach acid is a defense against some pathogens; using antacids makes this problem worse), therefore, foodborne illness can be deadly.

Glossary – some terms you should be familiar with when discussing food safety

bacteria – microorganisms that commonly cause food poisoning. Microorganisms are living things that you need a microscope to see individually – viruses, bacteria, fungus, etc.

calibrate – to adjust a measuring instrument so that it reads accurately. For example, to adjust a thermometer so that it reads 32 degrees F in ice water.

contamination – when a food has harmful bacteria in it.

cross-contamination – when a food that is contaminated with bacteria comes in contact with another food. This can happen by the two foods touching directly or through a common utensil, surface, hand, etc. that comes in contact with both foods.

danger zone – temperatures between 40 degrees F and 140 degrees F. Bacteria grow best in this zone, so food should not be in this range for more than two hours.

emerging – when bacteria change or new bacteria are discovered that we didn't know about before, they are called emerging bacteria or emerging pathogens.

foodborne illness – food poisoning, or when something in food makes a person sick.

pathogens – bacteria that are harmful.

Fight BAC! – Make food safety a habit

Say

This lesson teaches basic food-handling techniques that can be applied in the home. It is based on the four principles outlined in the Fight BAC campaign: clean, separate, cook and chill.

Why is it important to keep your food safe? If food is not handled properly, you or your family could get sick with foodborne illness, or food poisoning. Foodborne illness can be especially dangerous for certain people -- like pregnant women, infants and young children, older adults and people with chronic diseases or weakened immune systems. It can even kill.

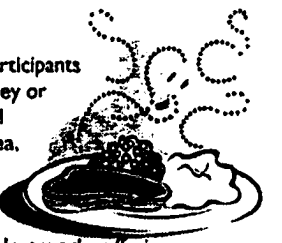
Do

Say

What causes food poisoning? Usually, harmful bacteria cause foodborne illness. Unfortunately, you cannot tell when food is contaminated by bacteria. It doesn't look, smell or taste bad. There are bacteria everywhere; they are not visible to the naked eye. Some bacteria are good or useful. They are used to make foods like cheese, yogurt and wine. Some bacteria spoil food (you can taste, feel or smell them), but they don't make us sick. Still other bacteria are neither good nor bad. But, the bacteria we are most concerned about can make us ill.

Do

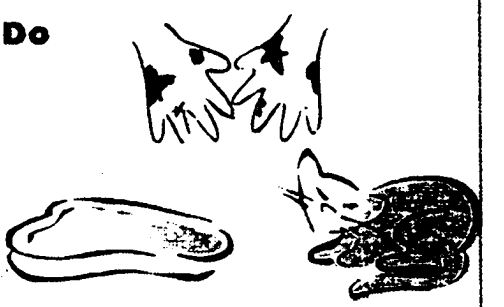
Optional: Have participants recall a time when they or their children were ill with vomiting, diarrhea, upset stomach, and think about costs associated with getting sick – money, lost work, suffering.



Say

They have names like Salmonella and E. coli O157:H7 that you've probably heard of. Two other common ones are Campylobacter and Staphylococcus, or "staph." They usually come from raw meat, poultry and eggs, but they can live in dirty places and on people, animals and pests like roaches, flies and rats. But don't panic! Harmful bacteria can be destroyed or controlled at safe levels if you always follow good food-handling habits. You can remember the four basic steps as: clean, separate, cook and chill.

Do

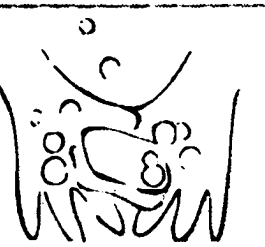


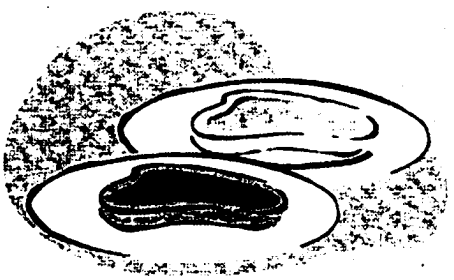
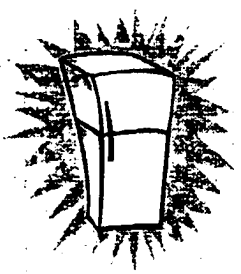
Say

Don't be a dope. Wash with soap! Get in the habit of washing your hands and kitchen surfaces often and well with hot soapy water. When?-Wash your hands thoroughly before and after handling food. Also, after using the bathroom, changing diapers, smoking, talking on the phone or handling pets.

Do

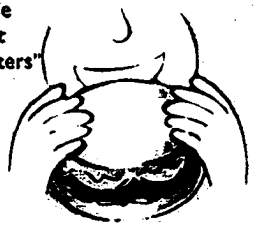
"Don't be a dope. Wash with soap!"



-Wash utensils, counters and cutting boards after you prepare each food item. If you wish, you can follow with a sanitizing solution made with one teaspoon chlorine bleach in one quart lukewarm water.	Optional: Ask participants to rub lotion from black light kit into their hands, wash carefully and then place them under the black light to see places they missed.
Say Watch that plate. Don't cross-contaminate. Cross-contamination occurs when bacteria are spread from a raw food to a food that is ready to eat (either cooked food or food that will remain uncooked, such as salad). To prevent cross-contamination: -Keep raw meat, poultry and seafood separate from other foods when you shop (make sure the person bagging your groceries keeps them separate as well). When you get home, keep these foods separate in the refrigerator. It is best to place raw meat products in a pan or dish on the bottom shelf of the refrigerator, so they won't drip on other foods. -After you've cooked meat, poultry or seafood, don't put it back on the same dish that held it when it was raw. Make sure to thoroughly clean your hands and any utensils, dishes and cutting boards that came into contact with the raw meat.	**Do** "Watch that plate. Don't cross contaminate." 
Say Be sure to thaw raw meat in the refrigerator, microwave or in cool water -- not on the counter. Plan ahead, because it may take a while for foods to thaw in the refrigerator. For large items, allow one day for every five pounds of weight. For faster thawing, place food in a sealed plastic bag immersed in cold water. Change water every 30 minutes. Cook food thawed in the microwave right away.	**Do** "Make it a law. Use the fridge to thaw." 
Say Cook it right before you take a bite. Cooking kills most harmful bacteria, if you do it right. That means the food must reach a certain temperature **on the inside.** A clean thermometer is the best way to ensure that your food has reached a	**Do** "Cook it right before you take a bite!" Optional: Demonstrate how to calibrate a thermometer. It should register 32 degrees when placed in ice water slush in a Styrofoam cup and 212 degrees in boiling water. Use the calibration

safe temperature. A thermometer is a great investment to make toward your family's health.

nut to adjust. (See the USDA/FSIS fact sheet "Kitchen Thermometers" for instructions on calibration.)



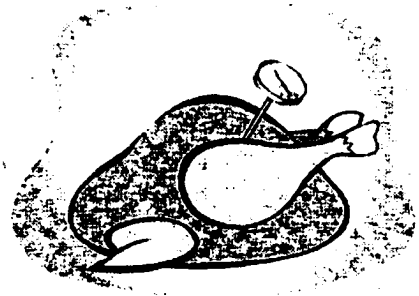
Say

So what is the proper internal temperature? It depends on the food. Look at the chart in your brochure.

- -Roasts and steaks should be cooked to at least 145 degrees F.
- -Ground beef should be at least 160 degrees F inside. Do not eat ground beef that is pink inside. Cook ground poultry to at least 165 degrees F.
- -Cook whole chickens and turkeys until the temperature in the thickest part of the thigh is 180 degrees F. Chicken breasts should reach at least 170 degrees F. Juices should run clear, not pink.
- -Pork should be cooked to 160 degrees F (170 degrees F if you cook it in the microwave).
- -Fish should flake easily with a fork when cooked enough.
- -Cook eggs until the whites are firm and the yolks are not runny. Avoid recipes that call for raw or undercooked eggs, like egg nog, homemade ice cream or Caesar salad dressing.
- -When you reheat sauces, gravies or soups, bring them to a rolling boil. Reheat any other leftovers to at least 165 degrees F.

Do

"What is the proper internal temperature?"

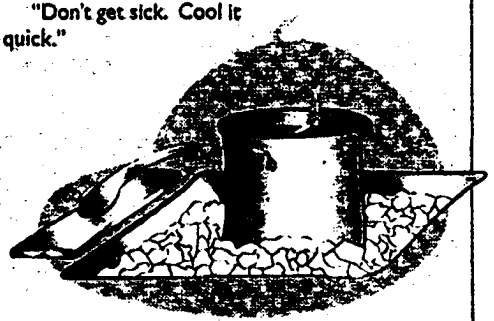


Say

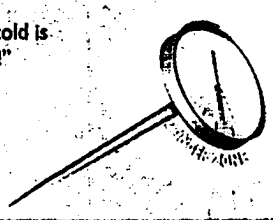
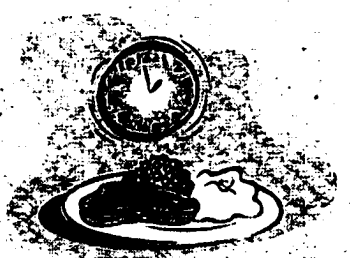
Don't get sick. Cool it quick. Cool cooked food as quickly as possible. Refrigerate it within two hours. To cool leftovers quickly, put them into small, shallow containers so the center gets cool faster. For thick gumbo, chili or stews, place the large pot in the sink with ice and water. Stir for awhile and then pour into shallow pans–two or three inches deep. Refrigerate or freeze. Food may still be warm, but should not be so hot it heats up refrigerator or freezer.

Do

"Don't get sick. Cool it quick."



Fight BAC! - Make food safety a habit!

Say	Do
Hot or cold is how to hold. The temperature danger zone is between 40 and 140 degrees F. That's where bacteria grow fastest. It is best to keep hot foods hot and cold foods cold. If you have to hold food, keep hot food over a heat source or in a heated oven. Keep cold food on ice or in the refrigerator.	"Hot or cold is how to hold!" 
Say More than two are bad for you. Never let food stay in the danger zone (which includes room temperature) for longer than two hours. Especially in our hot summer months, try to keep food at room temperature for the least amount of time. If you follow the cooking and chilling guidelines, your foods should be kept out of the danger zone. When considering this time limit, include preparation and serving time. When shopping, pick up perishable foods last, and put them up first when you get home.	**Do** "More than two are bad for you!" 
Say The bottom line when it comes to keeping your food safe is simple. Keep your home, yourself and your kitchen **clean**. Be sure to keep potentially hazardous foods **separate** from those which have been cooked or will be served uncooked. And be sure to **cook** and **chill** food properly to keep it out of the danger zone. And always remember, **when in doubt, throw it out!**	**Do** "When in doubt, throw it out!" Distribute refrigerator magnet or fact sheet. Ask participants to make an effort for the next month to make these practices into habits. 

Visit Our Website: http://www.agctr.lsu.edu/wwwac

Primary authors: Ellen Alley, MS, Extension Associate, Food technology/Food safety
Saralene B. Seals, PhD, Specialist, Nutrition and Health
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Adapted from the Partnership for Food Safety Education's Fight BAC campaign, and Foodfalk (an electronic publication from the University of Nebraska Cooperative Extension in Lancaster County).

Louisiana State University Agricultural Center, William B. Richardson, Chancellor
Louisiana Cooperative Extension Service, Jack Bagent, Vice Chancellor and Director

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APPENDIX C

LOUISIANA STATE UNIVERSITY AGRICULTURAL CENTER GROUP EVALUATION SYSTEM FOOD SAFETY LESSON AND EVALUATION SUPPORT MATERIAL

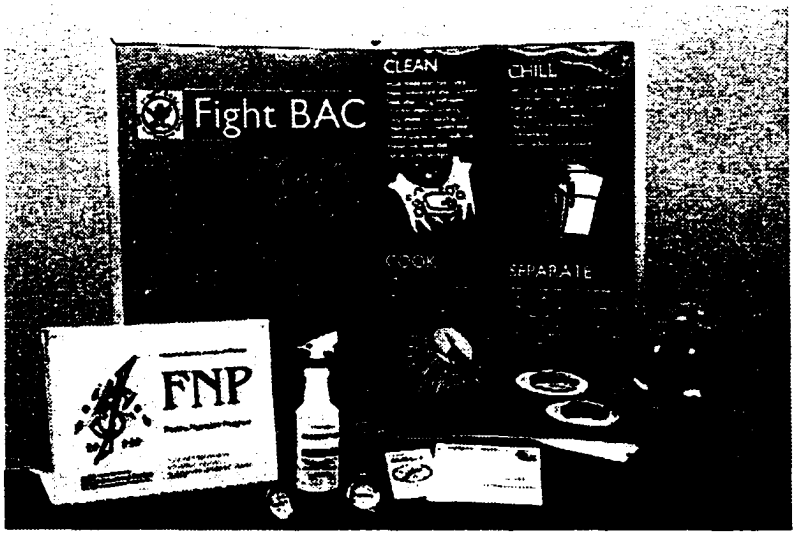


Figure 2. Instructional support material for Louisiana State University Agricultural Center Food Safety Lesson

Figure 3. Group Evaluation System Food Safety Graphic Illustrations Flip Chart Display

APPENDIX D

READABILITY MEASURES OF GROUP EVALUATION SYSTEM FOOD SAFETY EVALUATION INSTRUMENT AT THREE INTERVALS

Intervals	Food Safety Content Statements	Flesch Reading Ease	Flesch-Kincaid Grade Level
1	Family and Consumer Sciences	65.0	7.9
2	GES Instrument (Version 1)	68.2	8.4
3	GES Instrument (Version 2)	68.0	8.3

Note. Readability scores calculated with Soft-Art, Microsoft Word 97 computer software.

APPENDIX E

GROUP EVALUATION SYSTEM FOOD SAFETY EVALUATION INSTRUMENT (VERSION 1)

Fight BAC! Food Safety
Family Nutrition Program
LSU AgCenter

Name: _____ **Date**_____

Location: _____

Parish: _____

Instructions: The instructor will read the evaluation items to you one at a time and show you a picture that goes with that item.

Please mark the following evaluation survey with a circle around your answer.

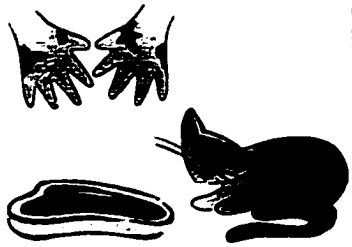
The responses to the items will be one of two types:

I learned .....

			
Yes	**No**	**Already knew it**	**Don't know**

I will do.....

			
Yes	**No**	**Already do it**	**Don't know**



1. Today I learned what can cause foodborne illness.

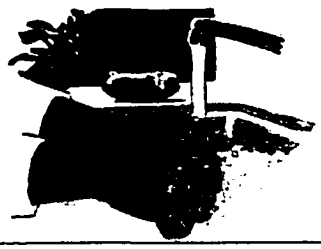
Yes	No	Already knew it	Don't Know

2. Today I learned how to reduce my chances of getting a foodborne illness.

Yes	No	Already knew it	Don't Know

3. Today I learned that a food thermometer is the best way to determine whether a food is cooked enough.

Yes	No	Already knew it	Don't Know

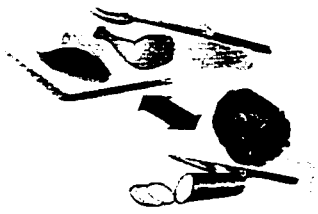


4. As a result of what I learned, I will wash my hands with hot, soapy water before handling food and after using the bathroom, changing diapers and handling pets.

Yes	No	Already do it	Don't know

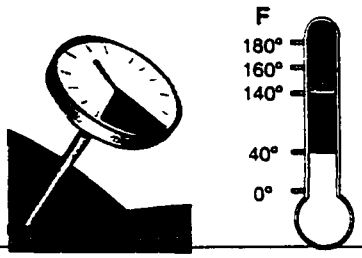
5. As a result of what I learned, I will wash cutting boards, dishes, utensils and counter tops with hot, soapy water after preparing each food item and before going on to the next.

Yes	No	Already do it	Don't know



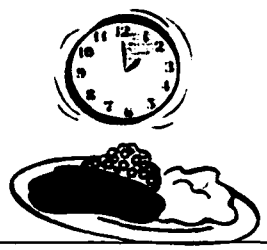
6. As a result of what I learned, I will keep raw meat, poultry and seafood separate from other foods (in the grocery cart, in the refrigerator and while preparing).

Yes	No	Already do it	Don't know



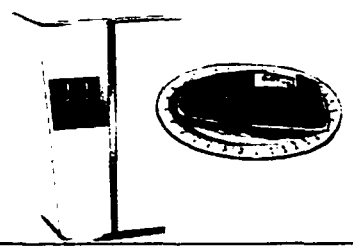
7. As a result of what I learned, I will use a food thermometer and temperature chart to determine whether foods (especially meats) are cooked all the way through.

Yes	No	Already do it	Don't know



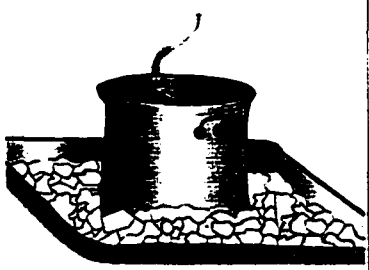
8. As a result of what I learned, I will make sure food is not kept in the danger zone (40 degrees F to 140 degrees F) for more than two hours.

Yes	No	Already do it	Don't know



9. As a result of what I learned, I will defrost food only in the refrigerator, under cold water or in the microwave.

Yes	No	Already do it	Don't know



10. As a result of what I learned, I will cool large batches of food quickly by putting the pot in ice water and stirring, and then dividing into small, shallow containers.

Yes	No	Already do it	Don't know

APPENDIX F

GROUP EVALUATION SYSTEM FOOD SAFETY EVALUATION INSTRUMENT ITEM RATING SCALE

Panelist: _____ Date: _____

A panel of experts can review items on a survey to rate them on how closely they match the learning objectives and may establish face or content validity for the instrument. Attached is a copy of the GES Content Validity Rating Form with the learning objective and an area for your responses on the form. Please rate how well each GES written item and the corresponding graphic image match the following food safety nutrition objective.

Food Safety Nutrition Education Objective:
Louisiana residents and food handlers will improve food safety by controlling or eliminating foodborne risks.

1. Items will be rated from poor (1) to excellent (5).
2. Please evaluate both the written text and the corresponding graphic image.
3. By placing the pages of the GES next to the page of the rating scale, numbered items will line up visually.
4. Comments about each item are requested

How well does the text and graphic match the stated GES objective?						
Item	Poor	Weak	Average	Good	Excellent	Objective: Louisiana residents and food handlers will improve food safety by controlling or eliminating foodborne risks.
#	1	2	3	4	5	Comments on Items
1						
2						
3						
4						
5						

(table cont.)

How well does the text and graphic match the stated GES objective?						
Item	Poor	Weak	Average	Good	Excellent	Objective: Louisiana residents and food handlers will improve food safety by controlling or eliminating foodborne risks.
#	1	2	3	4	5	Comments on Items
6						
7						
8						
9						
10						

(table cont.)

Other comments:

Thank you very much for your comments and suggestions. I appreciate your comments and suggestions and will forward follow-up data when the research is complete.

Annrose Guarino

APPENDIX G

EXPERT PANEL INTRODUCTION LETTER

June 27, 2000

«Salutation» «FirstName» «LastName», «JobTitle»
«Department» «Company»
«Address1»
«City», «State» «PostalCode»

Dear «Salutation» «FirstName» «LastName»,

My name is Annrose Guarino and I am a Registered Dietitian currently working with limited resource individuals and families as a community nutrition educator. As part of a doctoral program in Adult Education in the LSU School of Vocational Education, I am designing and validating an evaluation instrument for my research in nutrition education. You were recommended as a technical expert to participate on an evaluation validity panel to assess the content validity of the survey tool.

The GROUP EVALUATION SYSTEM (GES) is being designed for use with limited resource adults of varying literacy competency. It will be used as an evaluation tool to measure program outcome following a community nutrition lesson. In limited resource audiences, many adults are functionally illiterate and are not able to read even simple text without assistance. With the GES, an exit survey for group administration, the instructor will read each question while a graphic is shown. A smaller version of the same graphic image will be on the survey instrument preceding the written text. The oral reading of the survey text along with a pictorial "review" of the material covered in the lesson allows both reading and non-reading adults to participate in the program evaluation process.

Within a short period, you should be receiving the GES validation packet containing:

1) A cover letter from the researcher
2) The 10 item (written and pictorial) Food Safety Group Evaluation Instrument
3) The Evaluation Rating Scale for the GES instrument to establish content validity
4) A Technical Panelist Information Form

Please let me know if you are unable to participate. Thank you for your support .

Sincerely,

Annrose Guarino
Principal Investigator

Geri Holmes, Ph.D.
Professor

APPENDIX H

EXPERT PANEL COVER LETTER

May 31, 2000

«Salutation». «FirstName» «LastName», «JobTitle»
«Department»«Company»
«Address1»
«City», «State» «PostalCode»

Dear «Salutation». «LastName»,

Thank you for agreeing to help with the review of the Group Evaluation System (GES), an instrument designed to identify food safety nutrition education outcomes in adult limited resource audiences of varying literacy competencies. I am asking you to participate in the GES developmental process by serving on the instrument validation panel. This will require you to complete the GES feedback form.

The purpose of my dissertation is to develop the GES. The initial GES is based on existing research on nutrition education outcome evaluations of adults with limited literacy skills. The GES will be tested with adult readers and nonreaders in two rounds of data collection. Accompanying statistical tests and scale refinement will be conducted to yield a concise, operational and practical instrument, potentially applicable to other settings, with an established degree of validity.

The GES will focus on "Food Safety." Community nutrition educators are among those who could use this tool to establish a more comprehensive program outcome measure. Such efforts may include refinement of lessons for non-readers.

Please assess the validity of the GES, with particular attention on the following:

Does the GES appear to measure what it is intended to measure?
Do the items capture the key elements of the GES constructs?
Are the directions and items clear and easy to understand?

Your comments and suggestions or ideas to improve the GES are requested. Please write on the GES survey as much as you like. If at all possible, I would like to have your completed GES and feedback by June 15, 2000. Please call me at (225) 388-1425 if you have questions. Thanks again for your help!

Sincerely,

Annrose Guarino
Principal Researcher

Geraldine Holmes, Ph.D.
Professor

APPENDIX I

EXPERT PANEL DEMOGRAPHICS FORM

Name: _____ Date: _____

1. Title(s) and Affiliation(s):

_____

_____

_____

2. Field(s) of Expertise and Years of field experience:

_____

_____

_____

3. Highest level of education achieved:

_____

4. Other comments you wish to make about yourself:

_____

_____

_____

_____

_____

_____

_____

_____

_____

APPENDIX J

RECOMMENDED MODIFICATIONS TO GROUP EVALUATION SYSTEM FOOD SAFETY EVALUATION INSTRUMENT (VERSION 1) BY EXPERT PANEL AND FOCUS GROUPS WITH SUBSEQUENT INSTRUMENT REVISIONS

Cover Letter

Expert Panel

- Need instructions telling the evaluator to read (aloud) the GES instructions and explain exactly what each answer means.
- Directions and items are easy to understand
- Maybe add another sentence in the instructions. It may seem condescending to someone.
- Need more room to write name

Semi-Functional Reader Focus Group

- Leave word "evaluation" in; it is more versatile than "test"
- Should say to "circle correct answer"
- Give them more to read. The pictures are a "give away," makes it too easy and does not allow them to read.
- Good for readers and nonreaders

Functional Reader Focus Group

- The space for the name is OK
- For responses, use "Know it" and "Do it" and omit word "Already"
- Use either the word "questions" or "items"
- Space is OK
- First page is OK
- Need more space for the name

Instrument Modifications

- Bolder type face
- Heading rearranged by placing title first
- Added more space for name and shortened space for date
- "Location" was changed to "site" and "parish" was changed to "town and parish"
- Instructions were simplified.
- Identified the sample items
- Removed the boxes with elements
- Text changed by deleting "don't know" response and word "evaluation"
- Text changed by deleting "already" from "knew it" and "do it"
- Added white space between items

Item 1

Expert Panel

- I am not sure the message is clear in graphic. It needs a photo of a person feeling sick! The causes of foodborne illness are not readily identifiable.
- The graphic that is not the cat or the hands is not clear. It could be a pet dish or a form of a steak.
- Could it more clearly look like a dish? Is word "today" needed?
- Is "foodborne" a word the client understands or will understand from lesson? Suggest in place of "foodborne illness" use "that food can make me sick."
- Is there another phrase for "foodborne illness?" The pictures will be introduced throughout the lesson. Graphics are great and a must for all.
- Meat could be in a package so you know it's raw. This is probably the least evident graphic of all the items.
- Is there another phrase for "foodborne illness?" The pictures will be introduced throughout the lesson

- The cat looks like a mouse; the hands look blotchy. Is that a piece of meat or a cat's bowl? Showing bacteria here are more appropriate. Organisms cause foodborne illness.

Semi-Functional Reader Focus Group

- It is an easy question-the picture tells the meaning of the question
- Add a picture of a bar of soap to show handwashing
- I already knew it
- Don't need the "I don't know" choice

Functional Reader Focus Group

- It should show someone eating something that "does not agree with them"
- Let them play with something that shows hands getting dirty
- Put something over the meat, a label that says "Salmonella"
- Instructions should say to "circle" response
- Use "food sickness" for "foodborne illness"
- Show playing in the dirt
- Show someone touching a pet
- It looks good

Instrument Modifications

- Illustrations were simplified by removing the shading from the hands and converted to simple outline drawings
- Cat illustration changed to be more realistic
- Created more white space by removing lines
- Bold face type "Today I learned"
- Changed graphic illustration of beef to chicken
- Text changed from "foodborne illness" to "food poisoning"

Item 2

Expert Panel

- Reinforces value of presentation.
- I understand the "X" and "BAC," does the audience? How much were they exposed to through the on art work and the relationship to the stated objective
- Is the word "today" needed
- If there is no other word for "foodborne illness," introduce the phrase before the lesson: write it, speak it, and discuss it.

Semi-Functional Reader Focus Group

- It is clear
- The band or line crossing over the picture, means, "No, like no smoking"
- It is easy to answer

Functional Reader Focus Group

- This is a harder question
- It is better to say "get sick from food"
- The picture of bacteria is good
- It is OK

Instrument Modifications

- Illustration is simplified by removing shading on images, made line drawings
- Text changed from "reduce my chances of getting a foodborne illness" to "avoid food poisoning"

Item 3

Expert Panel

- What food is that? Meat? We do not usually put thermometers in potatoes, vegetables, although we could.
- Does the thermometer look like one a client would use? Do they use a thermometer? How does a thermometer control foodborne risks for this audience?

- Is the word "today" needed? Could another type of meat be pictured? How often do they cook a whole turkey?
- "Thermometer" is another vocabulary word to introduce
- Seems to be a leading question, super simple, to test if they were listening or not.

Semi-Functional Reader Focus Group

- It is easy to answer
- It tells you what to do

Functional Reader Focus Group

- A good picture of washing your hands
- I like the shaded picture
- This one is clear

Instrument Modifications

- Food item was placed on serving platter
- Converted from a shaded image to a more realistic line drawing
- More detailed, realistic thermometer
- No change in text

Item 4

Expert Panel

- Do you want them to know the correct way to wash their hands. If so, this will not tell them
- Excellent match
- Very good match to lesson objective
- I liked the wording. Maybe shorten the sentence by deleting diapers and handling pets.
- Say "Washing hands is important" or "you should always wash hands after"

Semi-Functional Reader Focus Group

- It is easy to answer
- It tells you what to do

Functional Reader Focus Group

- A good picture of washing your hands
- I like the shaded picture
- This one is clear

Instrument Modifications

- Shaded graphic illustration and converted to a line drawing
- Removed background
- No change in text

Item 5

Expert Panel

- Do we really need to do this? Should the question address after handling meat and before preparing vegetables or other food?
- Less words, the better for the non-readers. Always introduce important words before lesson
- It is hard to see what she is doing
- An excellent match

Semi-Functional Reader Focus Group

- It is OK
- It tells you what to do

Functional Reader Focus Group

- Good picture
- Not too many words

- Better with simpler words
- It is fine

Instrument Modifications

- Removed shading, converted graphic illustration to a simplified line drawing
- Text was changed by deleting "and before going on to the next"

Item 6

Expert Panel

- Somewhat confusing, maybe somehow show
- The graphics for responses are excellent. As long as all graphics are introduced throughout lesson, they are a must in this evaluation
- Great match
- Give example (*i.e.*, of type of raw meat in text)

Semi-Functional Reader Focus Group

- I thought the cucumber was a sausage on the cutting board with the vegetables
- "Chicken" is a better word than "poultry"
- Call it what it is: chicken

Functional Reader Focus Group

- This is a tricky question
- You can tell the separation of the food is there
- The word "poultry" is OK. It does not have to say chicken.

Instrument Modifications

- Graphic illustrations were converted to line drawings
- Changed image of cucumber to tomato
- Changed lettuce from shaded image to line drawing
- Changed chicken leg from shaded illustration to line drawing

- Changed shaded beef image to outlined fish
- Changed cutting board from shaded to line drawing
- Removed the two way arrow between two cutting boards
- Text was changed from "poultry" to "chicken"

Item 7

Expert Panel

- It looks like 40 - 140 is the correct final temperature
- Add the words "no pinkness"
- A great match
- I see a relationship here that I did not see on Item #3

Semi-Functional Reader Focus Group

- Shows two things are separate
- I am not going to do that.
- It should say "constantly check the food to see if it is done"
- Picture tells the statement

Functional Reader Focus Group

- Word "poultry" is fine. Show grocery cart, refrigerator
- Show a plate with no food
- This one is fine
- There is a thermometer, Can't get much clearer than that
- Looks OK
- It does not look like a turkey

Instrument Modifications

- Changed the illustration from a shaded partial image to a full line drawing, full line drawing image of a chicken with a meat thermometer on a serving platter

- Changed the thermometer drawing by simplifying it and eliminated black shaded area and added gray scale shading

- No change in text

Item 8

Expert Panel

- Again, list important vocabulary words. I still think it needs shorter sentences. A non-reader will not be able to follow these sentences.

- Put the thermometer with the danger zone here

- A great match

Semi-Functional Reader Focus Group

- The picture does not match

- Put a pot on the stove with food in it

- The clock looks like 2 o'clock

- Food looks like ground meat

- Once food is plated up, it is going to be eaten quickly

Functional Reader Focus Group

- Not a good question

- Not a good question, add a thermometer

- Needs a thermometer

Instrument Modifications

- Changed the single clock and plate of food presentation to a double clock and two plates of food demonstrating lapped time and food consumption

- Line drawings replace the shaded images

- No changes in text

Item 9

Expert Panel

- Add to text, "cold running water." and add graphic of it.
- Graphic not quiet as explicit as others, but still very clear when statement is read.
- Do you need to change the water? If you want them to know that.
- Show cold water
- Would audience more likely use the term "thaw" instead of "defrost?" These graphics are not clear and probably will not reproduce well.
- Need much more white space

Semi-Functional Reader Focus Group

- Could be confusing to some
- Needs a picture of a microwave
- Meat does not look frozen
- Looks like you are defrosting the refrigerator

Functional Reader Focus Group

- Good question
- Show cold water and microwave
- Show microwave and running water
- Show microwave
- Show picture of food under cold water

Instrument Modifications

- Drawings were changed from two illustrations to three
- Placed the defrosting meat under water in a sink
- Added a microwave line drawing

- Simplified refrigerator graphic illustration
- Text was changed from "defrost food only in" to "only defrost food in"

Item 10

Expert Panel

- Shows incorrect pan, maybe add shallow pans with arrow coming from large pot.
- Add "and refrigerate or freeze"
- Is this a technique used for home use or commercial use?
- Does it need to show shallow pans?
- This may be a recommendation, but I do not think this is a practice they will follow.
- Great match

Semi-Functional Reader Focus Group

- Re-ask question, step by step
- Add picture with spoon stirring
- Add small containers

Functional Reader Focus Group

- I won't do that
- Good picture
- I will not put the pot in ice. Add pictures of small containers and a spoon
- Add little containers
- Show small containers and a spoon in a pot

Instrument Modifications

- Created new line drawing
- Reduced size of pot from commercial quantity to family size pot
- Deleted the ice

- Showed spoon and small size clear food storage containers with lids
- Text was changed from "stirring and then dividing" to "stirring and dividing"

General Comments

Expert Panel

- Measures what intended to measure, with the important elements captured.
- Great job! Good luck!
- Add word "to" between words "handlers" and "improve" in objective; Overall, I think your instrument is good. Your first 3 questions intend to measure "Today I learned" which is good. I don't know about question 5-10, "as a result of what I learned, I will . . ." We like to think that learning (behavioral change) results in practical change, but I'm not sure this is always true. I think you are measuring "intent", but I don't know that you can be very confident of people following through on that "intent"
- I want to see the results of this, especially from the beginning level readers (or illiterate adults) like those in the class I mentioned at the library.
- Have absolutely NO problem with whether they match GES objective if that's all you need to know.
- I feel that content validity is here in the instrument as far as matching to objective. What was the validity rating using a standardized validity test method? Will a demonstration by person administrating survey on how to mark the survey proceed administration of survey?
- I still think the "don't know" is confusing. The instructor will need to read both the statement and the possible responses each time, so they (instructors) would need graphic of responses. Instrument only evaluates what they plan to do. For actual impact you would need to re-test these 6 months later to determine to what degree they are following through with their plans. Questions seem "leading." I would answer "yes" to please the instructor (very few people would answer "no" outright) Ask your professor if a "maybe" is better.
- Spell out all words for heading: Louisiana State University Agricultural Center. We know what BAC means will they? Do you need their address or the name of the site in which they are completing the survey? Does "don't know" mean the same as "no?" The fewer number/categories, the easier for them to respond. Maybe add another sentence in your instructions in order that they may seem condescending to someone. In addition, I do feel that sharp images will reproduce better than the shaded ones you have- think a simple illustration with thick lines.

- Overall, I would give the test items and accompanying graphics a "good to excellent" rating. I think that they will accurately measure the participants understanding of food safety. I assume you will go over the meaning of the symbols and directions and test items several times with them before administering the test. In addition, I think it would be valuable to give a before and after test to see how much the participants learned from your instruction.

- I think overall, this is excellent. The graphics along with text is a must for nonreaders. If you can shorten and/or add more white space and/or introduce important vocabulary words at beginning of the lesson, this will increase chances of a non-reader understanding and following.

Semi-Functional Reader Focus Group

- Add a place for comments

- Need more white space

- Print size and shape of images are OK

Functional Reader Focus Group

- The questions are not easy

- Use "food poisoning" for "foodborne."

- Space for name could be longer. Take some space off the date. The parish space is too long.

Instrument Modifications

- More white space

- Bolder type face

- Simplified drawings with realistic detail

- Removed lines

- Formatted text at the top of the box

- Repositioned the response choices

APPENDIX K

COLLABORATING COMMUNITY AGENCY FOCUS GROUP LETTER

July 10, 2000«address_2»

Dear Collaborating Community Researcher,

Thank you for agreeing to assist me with a review of the Group Evaluation System (GES), an instrument designed to identify food safety nutrition education outcomes in adult limited resource audiences of varying literacy competency. I am asking you to participate in the GES developmental process by facilitating the planning and development of a Modified Focus Group Discussion with an instrument validation panel consisting of limited resource adults. This will require you to help me identify limited resource adult individuals who may be willing to review and discuss the GES food safety evaluation instrument in a small group research setting. Each member of the panel will also be asked to provide a brief personal information profile and sign a study consent form.

The purpose of my study is to develop and validate the GES based on existing research on nutrition education outcome evaluations of adults with limited literacy skills. Adult readers and non-readers will test the GES in two rounds of data collection. The GES focuses on "Food Safety."

The GES is an exit survey instrument for group administration following a food safety lesson. The instructor reads each item to the group and the participants view a corresponding graphic. A small copy of the image shown to the group is printed on the survey instrument preceding the corresponding written text. The oral reading of the text along with a pictorial "review" of the lesson content allows both reading and non-reading adults the opportunity to participate in a program evaluation group administered process.

Comments, suggestions and ideas gathered from a modified focus group discussion with participants from the target population will help to improve the GES.

Please call me by July 21, 2000 and let me know if you are able to assist me with identifying individuals who meet the limited resource criteria and who may be willing to participate in the instrument validity panel focus group.

Please call (225) 388-1425 if you have any questions. Thanks again for your help!

Sincerely,

Annrose Guarino
Principal Researcher

Geraldine Holmes, Ph.D.
Professor

APPENDIX L

HUMAN SUBJECT CONSENT FORM

1. Study Title: Developing and validating an instrument format for evaluating the effectiveness of nutrition education instructional programs delivered by the LSU AgCenter Cooperative Extension Service.

2. Performance Site: Louisiana State University and Agricultural and Mechanical College, Baton Rouge, LA

3. Investigators: The following investigators are available for questions about this study, M-F, 8:00 a.m. - 4:30 p.m. Dr. Geraldine Holmes (225) 388-2464
   Annrose M. Guarino (225) 388-1425

4. Purpose of the Study: The purpose of this research project is to develop and validate an instrument format for evaluating the effectiveness of nutrition education instructional programs delivered by the Cooperative Extension Service.

5. Subject Inclusion: Subjects will be volunteer male and female adult participants in the LSU AgCenter Family Nutrition Program who are16 years of age or older and who are currently outside of the K-12 formal education system.

6. Number of subjects: 120

7. Study Procedures: The study will be conducted in four phases. First, the Group Evaluation System (GES) will be developed and then, an expert panel will validate the GES. In the third phase, subjects will participate in a brief food safety lesson and complete the GES survey. Finally, some study participants will be interviewed immediately following the survey.

8. Benefits: Subjects will receive practical food safety information and materials for participating in the study. Additionally, the study may yield valuable information about how to best measure what people learn in food safety classes.

9. Risks: The only study risk is the accidental release of sensitive information found in the questionnaire; however, every effort will be made to maintain confidentiality of the study records. Files will be kept secure in cabinets with only investigator access.

10. Right to Refuse: Subjects may choose not to participate or to withdraw from the study at any time without penalty or loss of any benefit they might otherwise be entitled.

11. Privacy: Results of the study may be published, but no names or identifying information will be included in the publication. Subject identity will remain confidential unless disclosure is required by law.

12. Signatures:

The study has been discussed with me and all my questions have been answered. I may direct additional questions regarding study specifics to the investigators. If I have questions about subjects' rights or other concerns, I can contact Charles E. Graham, Institutional Review Board, (504) 388-1492. I agree to participate in the study described above and acknowledge the investigator's obligation to provide me with a signed copy of this consent form.

_____

Signature of Subject

_____

Date

APPENDIX M

FOCUS GROUP DEMOGRAPHICS FORM

1. Name: _____Date: _____

2. Age at last birthday: _____

3. Race: (Circle best answer)

Black

White

Hispanic

Asian

Native Indian

Other

4. Education: (Circle highest grade or training level):

1 2 3 4 5 6 7 8 9 10 11 12

G.E.D

Job Training

Some college

Have Degree

5. Employment:

Full-time

Part-time

Unemployed

Disabled

Retired

6. Please indicate best answer:

I CAN.....

_____read a newspaper well

_____read most things in a newspaper

_____read just a little of the newspaper

_____hardly read the newspaper

7. Assistance programs you are or have participated in: (Circle all that apply)

Food Stamps

TANIF

Social Security

Commodities

WIC

Head Start

Child Nutrition

APPENDIX N

FOCUS GROUP MEETING LOGISTICS FORM

Date: _____

Location: _____

Start time: _____

End time: _____

Focus sub-group: _____Reader _____Non-reader

Gender Ratio: _____Male _____Female

Age _____

Participating research Staff:

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

Notes:

APPENDIX O

FOCUS GROUP QUESTIONS

The FGD for this study representing the target audience will be made up of readers and nonreaders.

To explore the suitability of the Food Safety instrument for food stamp participants, sample focus group discussion questions will include:

1. What did the question mean to you?
2. Was it easy or hard to answer?
3. What made it easy or hard for you to answer?
4. What further ideas do you have that were not brought out by the question?
5. How would you ask the question?
6. How do you feel about questions that have the answer "I don't know"?
7. Are there any words that are hard for you?
8. How do the pictures help get the message across?

These questions will explore the panelist comprehension of the written (or orally delivered) content statements and will attempt to establish that the GES excludes factors that are unrelated to the purpose of the measurement in this study, *i.e.*, math skill or reading ability.

APPENDIX P

FOCUS GROUP SELF-REPORTED GENDER, ETHNICITY, AGE, EDUCATION, EMPLOYMENT, PUBLIC ASSISTANCE, AND LITERACY SKILLS

Demographic	Reading Groups: Semi-Functional n	Semi-Functional %	Functional n	Functional %	Total n	Total %
Gender						
Male	4	40%	-	-	4	22%
Female	6	60%	8	100%	14	78%
Total	10	100%	8	100%	18	100%
Race						
Black	8	80%	4	50%	12	67%
White	2	20%	4	50%	6	33%
Total	10	100%	8	100%	18	100%
Age range						
16-17	-	-	1	13%	1	6%
18-20	-	-	3	38%	3	17%
21-30	2	20%	2	25%	4	22%
31-40	2	20%	1	13%	3	17%
41-50	-	-	1	13%	1	6%
51-59	4	40%	-	-	4	22%
60 +	2	20%	-	-	2	11%
Total	10	100%	8	102%	18	101%

Note. Percent exceeds 100% due to rounding.

(table cont.)

Demographic	Reading Groups: Semi-Functional n	Semi-Functional %	Functional n	Functional %	Total n	Total %
Highest Educational Grade[a]						
Third	1	10%	-	-	1	6%
Fourth	1	10%	-	-	1	6%
Seventh	1	10%	-	-	1	6%
Eighth	2	20%	-	-	2	11%
Ninth	3	30%	-	-	3	17%
Eleventh	2	20%	2	20%	4	22%
Twelfth	-	-	1	10%	1	6%
Graduate Equivalence Exam	-	-	5	50%	5	28%
Total	10	100%	8	80%	18	100%
Employment						
Full-time	-	-	2	25%	2	11%
Part-time	1	10%	5	63%	6	33%
Unemployed	2	20%	1	13%	3	17%
Disabled	5	50%	-	-	5	28%
Retired	2	20%	-	-	2	11%
Total	10	100%	8	100%	18	100%
Public Assistance[b]						
Food Stamp	3	30%	1	12.5%	4	22%
Commodities	1	10%	1	12.5%	2	11%
Social Security	6	60%	1	12.5%	7	39%
Women Infant & Children	-	-	1	12.5%	1	6%

(table cont.)

Demographic	Reading Groups: Semi-Functional n	Semi-Functional %	Functional n	Functional %	Total n	Total %
Ability to Read[c]						
I can read a newspaper	2	20%	8	100%	10	56%
I can read a few words in the newspaper	4	40%	-	-	4	22%
I cannot read the newspaper	4	40%	-	-	4	22%
Total	10	100%	8	100%	18	100%

[a] None for Grades 1, 2, 5, 6, 10, Job training, some college or have degree.
[b] None for TANIF, Head Start or Child nutrition
[c] No responders for "I can read most words in a newspaper

APPENDIX Q

GROUP EVALUATION SYSTEM STUDY SITE PARISH PROFILES ON FOOD STAMP RECIPIENTS, POVERTY RATES, LITERACY RATES, POPULATION SIZE, AND ECONOMIC INFLUENCES

Parish	n	Sample %	Food stamp recipients[1]	Poverty rates[2]	Low literacy rates[3]	Population size[4]	Economic influences
Orleans	70	72.92%	92,740	27.9%	39%	460,913 (Urban)	Tourism
St. James	18	18.72%	2,526	16.8%	36%	21,197 (Rural)	Industry
East Baton Rouge	8	8.33%	3,1781	16.0%	23%	393,94 (Urban)	Universities, government & industry
Total	96	99.97%					

Note. Totals do not equal 100% due to staff reported estimates

[1]Louisiana Department of Social Services Office of Family Support, 2000

[2] U.S. Bureau of the Census, 1998

[3]National Institute for Literacy, 1998

[4] U.S. Bureau of the Census, 2000

APPENDIX R

ARTIST PERMISSION

Subject: Re: Request for Permission to Use Illustrations
Date: Fri, 09 Jun 2000 11:56:48 -0400
From: rickcunningham <rickcunningham@earthlink.net>
To: <aguarino@agctr.lsu.edu>

Annrose,

Cunningham retains ownership of all original artwork. Cunningham Design hereby grants right of usage of the Eating Right is Basic illustrations to Annrose M. Guarino for reproduction and demonstration with the doctoral research project "Food Safety". Credit will be given in the form "illustrations by Rick Cunningham, Cunningham Design, Lansing Michigan".

Good luck Annrose.

Rick Cunningham

APPENDIX S

GROUP EVALUATION SYSTEM FOOD SAFETY EVALUATION INSTRUMENT (VERSION 2)

Fight BAC! Food Safety
Family Nutrition Program
Louisiana State University Agricultural Center

Name _____ **Date** _____

Site _____

Town _____ **Parish** _____

Instructions: The instructor will read out loud the evaluation items to you one at a time and show you a picture that goes with that item.

Please mark the following survey with a circle around your answer.

Sample Items

The responses to the items will be one of two types:

I learned .....


Yes


No

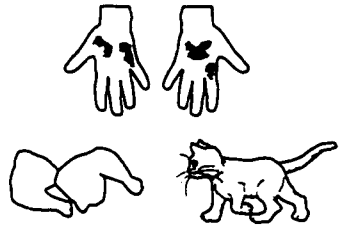
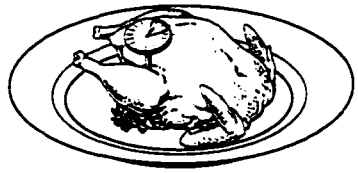
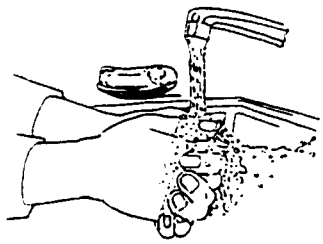

Already knew it

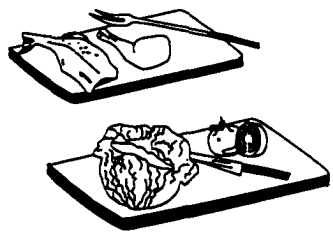
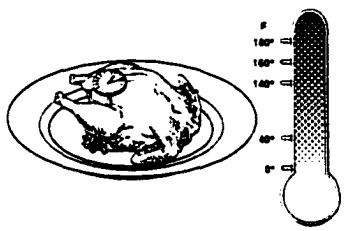
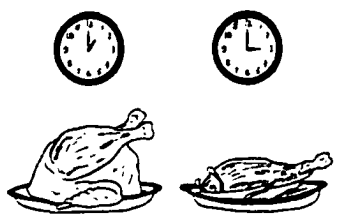
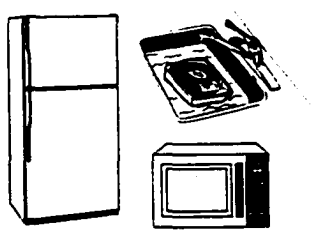
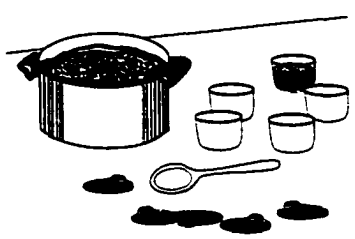
I will do.....


Yes


No


Already do it

	**1. Today I learned** what can cause food poisoning. ☑ Yes ☒ No ☆ Already knew it
	**2. Today I learned** how to avoid food poisoning. ☑ Yes ☒ No ☆ Already knew it
	**3. Today I learned** that a food thermometer is the best way to determine whether a food is cooked enough. ☑ Yes ☒ No ☆ Already knew it
	**4. As a result of what I learned,** I will wash my hands with hot, soapy water before handling food and after using the bathroom, changing diapers and handling pets. ☑ Yes ☒ No ☆ Already do it
	**5. As a result of what I learned,** I will wash cutting boards, dishes, utensils and counter tops with hot, soapy water before and after preparing each food item. ☑ Yes ☒ No ☆ Already do it

	**6. As a result of what I learned,** I will keep raw meat, chicken and seafood separate from other foods (in the grocery cart, in the refrigerator and while preparing). ☑ Yes ☒ No ☆ Already do it
	**7. As a result of what I learned,** I will use a food thermometer and temperature chart to determine whether foods (especially meats) are cooked all the way through. ☑ Yes ☒ No ☆ Already do it
	**8. As a result of what I learned,** I will make sure not to keep food in the danger zone (40 to 140 degrees F) for more than two hours. ☑ Yes ☒ No ☆ Already do it
	**9. As a result of what I learned,** I will only defrost food in the refrigerator, under cold water (changed every 30 minutes) or in the microwave. ☑ Yes ☒ No ☆ Already do it
	**10. As a result of what I learned,** I will cool large batches of food quickly by putting the pot in ice water, stirring, and dividing into small, shallow containers. ☑ Yes ☒ No ☆ Already do it

APPENDIX T

FORM FOR COLLABORATING AGENCY TO ESTIMATE PARTICIPANT DEMOGRAPHICS

1. Your Name _____ Date _____

2. Agency Name _____ Phone (____)_____

3. Agency
   Address_____

4. Parish
   _____

5. Referring person _____

6. Total number of participants in the study group _____

7. Gender ratio _____% Males _____% Females

8. Age range of participants

   _____ % 16-17 years old
   _____ % 18-20 years old
   _____ % 21-30 years old
   _____ % 31-40 years old
   _____ % 41-50 years old
   _____ % 51-59 years old
   _____ % 60 & over

9. Ethnicity:

   _____ % Black
   _____ % White
   _____ % Hispanic
   _____ % Asian
   _____ % Native Indian
   _____ % Other

10. Awareness of non-functional readers in group:

    _____% read a newspaper well
    _____% read most things in a newspaper
    _____% read just a little of the newspaper
    _____% hardly read the newspaper

11. Occupations of participants

_____ % Home by Choice
_____ % Retired
_____ % Work Full-time
_____ % Work Part-time
_____ % Unemployed
_____ % Disabled

12. Education level of group:

_____ % Unknown
_____ % Some Elementary
_____ % Some Junior High
_____ % Some High School
_____ % High School Graduate or G.E.D.
_____ % Some Job Training
_____ % Some college
_____ % Have College Degree

13. Assistance participants may receive:

_____ % Food Stamp
_____ % TANF
_____ % Social Security
_____ % Commodities
_____ % WIC
_____ % Head Start
_____ % Child Nutrition
_____ % Disability
_____ % SSI
_____ % Veteran Benefits

APPENDIX U

STUDY SITE PARISH PROFILE FORM

The investigator will research the following demographics:

1. Number of Food Stamp or cash assistance recipients in parish study site

   _____

2. Estimated rates of poverty for this parish _____

3. Estimated non-functional adult readers for this parish _____

4. Estimated population size: rural or urban _____

5. Major economic influences for parish: Forestry, oil industry, hospitality industry, etc.

   _____

   _____

APPENDIX V

ESTIMATED SUBJECTS GENDER, ETHNICITY, AGE RANGE, EDUCATION, LITERACY SKILLS, EMPLOYMENT, AND PUBLIC ASSISTANCE

			College Remedial Students					
Estimated	Senior Center	Housing Development	Class 1	Class 2	Class 3	Literacy Class	Mean	n
Gender								
Male	1%	0	10%	25%	40%	66%	23.67%	22.72
Female	99%	100%	90%	75%	60%	33%	76.17%	73.12
Total	100%	100%	100%	100%	100%	99%	99.84%	96.84
Note. Totals do not equal 100% due to staff reported estimates								
Ethnicity								
Black	100%	100%	60%	90%	70%	80%	83.33%	80.00
White	-	-	38%	5%	30%	20%	15.50%	15.50
Hispanic	-	-	2%	5%	-	-	1.17%	0.01
Total	100%	100%	100%	100%	100%	100%	100%	95.51
Age range								
16-17	-	-	-	5%	-	-	0.83%	0.80
18-20	-	-	10%	10%	20%	-	6.67%	6.43
21-30	-	20%	60%	50%	40%	10%	30.00%	28.80
31-40	-	30%	20%	15%	35%	40%	23.33%	22.40
41-50	-	15%	10%	15%	3%	50%	15.50%	14.88
50-59	-	15%	-	5%	2%	-	3.67%	3.52
60+	100%	20%	-	-	-	-	20.00%	19.20
Total	100%	100%	100%	100%	100%	100%	100%	96.03

(table cont.)

Estimated	Senior Center	Housing Development	College Remedial Students: Class 1	Class 2	Class 3	Literacy Class	Mean	n
Education								
Unknown	10%	00%	-	-	-	-	3.33 %	2.88
Jr. High	-	25%	-	-	-	5%	5.00 %	4.80
Some HS	-	25%	-	-	-	50%	12.50%	12.00
HS or GED	90%	40%	-	-	-	45%	29.17%	28.00
Job Training	-	-	-	-	-	-	-	-
Some College	-	-	100%[1]	100%[1]	100%[1]	-	50.00%	48.00
Total	100%	100%	100%	100%	100%	100%	99.67%	95.68
Estimated Literacy Skill								
Reading ability: Participant can...								
Read newspaper well	97%	35%	-	-	-	-	22.00%	21.12
Read most words in newspaper	-	30%	-	10%	5%	-	7.50%	7.20
Read just a little of newspaper	-	25%	20%	10%	55%	60%	28.33%	27.20
Hardly read newspaper	3%	10%	80%	80%	40%	40%	42.17%	40.48
Total	100%	100%	100%	100%	100%	100%	100%	96.00

[1] Adjusted estimate based on college enrollment.

(table cont.)

Estimated	Senior Center	Housing Development	College Remedial Students: Class 1	Class 2	Class 3	Literacy Class	Mean	n
Employment Status								
Full-time	-	10%	50%	75%	70%	60%	44.17%	42.40
Part-time	-	10%	40%	20%	25%	40%	22.50%	21.60
Unemployed	-	50%	10%	5%	5%	-	11.67%	11.20
Retired	97%	20%	-	-	-	-	19.50%	18.72
Total	100%	90%	100%	100%	100%	100%	97.84%	96.00
Note. Totals do not equal 100% due to staff reported estimates								
Public Assistance								
Disabled	3%	10%	-	-	-	-	2.17%	2.08
Food Stamps	-	80%	20%	30%	30%	-	26.67%	25.60
TANF	-	15%	-	-	-	-	2.50%	2.40
Social Security	99%	15%	-	-	-	30%	24.00%	23.04
Commodities	98%	30%	-	-	-	-	21.33%	20.48
WIC	-	15%	10%	-	-	-	4.17%	4.00
Head start	-	35%	-	-	-	-	5.83%	5.60
Child Nutrition	-	40%	-	-	-	-	6.67%	6.40
Disability	3%	10%	-	-	-	5%	3.00%	2.88
SSI	2%	-	-	-	-	-	0.33%	.31

VITA

The author was born June 13, 1955, in New Orleans, Louisiana, and resided in LaPlace, Louisiana until she became self-sufficient. She obtained her high school diploma in May 1973 from St. Mary's Dominican High School in New Orleans, Louisiana. She completed her Bachelor of Science degree in Vocational Home Economics Education at Louisiana State University, Baton Rouge, Louisiana, in May 1979. She earned her Master of Science degree in Marriage and Family Life at Louisiana State University, Baton Rouge, Louisiana, in May 1981.

Annrose completed coursework required for registration as a dietitian at Tennessee State University, Nashville, Tennessee in 1982 and completed her dietetics clinical training at St. Louis University, St. Louis, Missouri, in July 1985. She was employed as an outpatient Registered Dietitian at the Psychiatric Eating Disorder Clinic in St. Louis, Missouri in 1985. Annrose began a private practice and worked as a Registered Dietitian consultant in San Francisco, California from 1987 to 1990.

The author was employed as a Registered Dietitian by Ochsner Clinic in New Orleans, Louisiana for seven years from 1990 to 1997. She initially served as the Weight Management Program Coordinator and later, as the Director of the Division of Nutrition. Since then she has worked as the state program manager for the Family Nutrition Program at the Louisiana Cooperative Extension Service and is currently as the Principal Investigator for that community nutrition outreach program.

The author has been a resident of St. John the Baptist parish in LaPlace, Louisiana, for ten years.

DOCTORAL EXAMINATION AND DISSERTATION REPORT

Candidate: Annrose Mary Guarino

Major Field: Vocational Education

Title of Dissertation: Group Evaluation System Measuring Self-Reported Cooperative Extension Nutrition Education Program Impact in Adult Limited Resource Audiences with Diverse Literacy Skills

Approved:

Major Professor and Chairman

Dean of the Graduate School

EXAMINING COMMITTEE:

Date of Examination:

March 7, 2001